RAILROAD GAZETTE

FRIDAY, DEC. 12.

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Contributions.

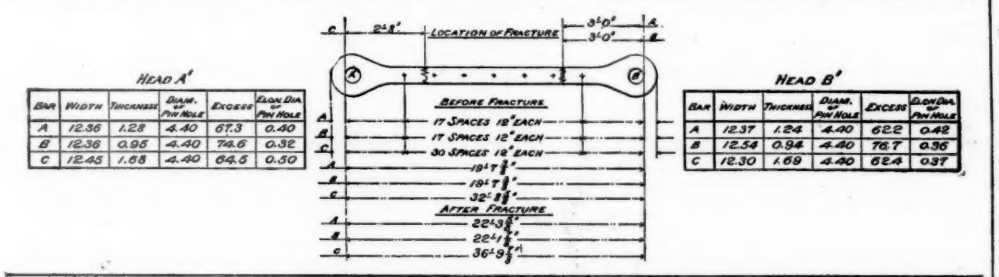
Eye-Bar Tests.

The Philadelphia Bridge Works, Cofrode & Saylor,
POTTSTOWN, Pa., Dec. 2, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We send you herewith a tabulated statement of tests made on iron eye-bars rolled by the Reading Rolling Mill Co., Reading, Pa., manufactured at our works for the Pennsylvania Railroad and tested at the Edge Moor Bridge Works.

The bars in question were simply die-forged under a hammer without previous upsetting, and we think that the results obtained may be of some interest to some of your readers. COFRODE & SAYLOR, Incorporated.



Bar	Width	Thickness	Diam. of Pin Hole	Excess	Elong. Dia. of Pin Hole
A	12.36	1.28	4.40	67.3	0.40
B	12.36	0.95	4.40	74.6	0.32
C	12.45	1.68	4.40	64.5	0.50

Bar	Width	Thickness	Diam. of Pin Hole	Excess	Elong. Dia. of Pin Hole
A	12.37	1.24	4.40	62.2	0.42
B	12.54	0.94	4.40	76.7	0.36
C	12.30	1.69	4.40	62.4	0.37

EYE BAR TESTS

Bar	Section: Nominal	Section: Actual	Section: Fractured	Area: Original	Area: Fractured	Area: Per Cent Reduction	Elastic Limit: Actual	Elastic Limit: Lbs. per Sq. Inch	Ultimate Strength: Actual	Ultimate Strength: Lbs. per Sq. Inch	Elongation in: Inches	Elongation in: Per Cent	Elongation in: Feet	Elongation in: Per Cent	Character of Fracture
A	6" × 1 1/8"	4.99 × 1.22	4.35 × 1.06	6.09	4.44	27.1	131 × 980	29.880	303.360	49.800	2.54	31.8	17'-6 1/2"	15.0	FIBROUS
B	5" × 7/8"	4.98 × .87	4.26 × .72	4.33	3.08	28.9	132 × 693	30.645	227.475	52.636	2.16	27.0	17'-0 1/2"	14.3	FIBROUS
C	5" × 1 5/8"	4.98 × 1.65	3.92 × 1.26	8.22	4.94	40.0	223 × 693	27.210	405.668	49.350	3.45	43.1	30'-3 11/2"	13.3	FIBROUS

A New Automatic Signal.

NEW YORK, Dec. 8, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having become thoroughly convinced, after much reading of your contributed articles on signals, that the average engineer is a blind man, and hence totally unable to distinguish the signals erected for his guidance; and, further, learning that most of them are also afflicted with deafness, rendering audible signals also of little use, I have, after long study, devised my patent sure acting, never failing asafetida signal, in the belief that these men, as a class, still retain the sense of smell.

By the use of a track instrument, operated by the entrance of an engine into a section, something less than a pint of this pungent fluid is projected over engineer and fireman, thus calling their instant attention to the fact that an immediate stop is necessary.

Thus, by this simple automatic action, a signal fulfilling all requirements is secured, and the engineer, though plunging through snow and fog, can rest assured that every signal, however obscure, will not fail him in the darkest hour.

The low cost of this application and its reliability convinces the inventor that it has only to be smelled to be appreciated.

C. W. BREWSTER,
Secretary Hit-'em-in-the-face Signal Co.

Dwarf Signals at a Crossover.

The following communication on the matter of the proper position of dwarf signals at a crossover has been delayed by the writer's absence from his office. The subject was opened in the issue of Nov. 14 by X. Y. Z., who asked whether dwarf signals at a double track crossover should be placed between the tracks or outside of them. The opinions of several men expert in signaling were published in the *Railroad Gazette*, Nov. 21 and 28.

Chicago, Milwaukee & St. Paul Railway,
Mechanical Engineer's Office,
MILWAUKEE, Dec. 2, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

. . . I probably look upon such matters from rather a different point of view from that taken by signal engineers of Eastern roads. On a single track road, and on one in which the system of signaling is just beginning to emerge from the inconsistencies and incompleteness of old methods, we are not always able to set a hard and fast rule for minor points of this character. For instance, the location of signals always in an invariable position in reference to the direction of the traffic is clearly not possible without much duplication of signal posts and the expenditure of much money unnecessarily. Thus, in block signaling by semaphore signals on our signal track lines, we use a single post with an arm on each side, preserving, of course, the direction of the semaphore arm in reference to the post, but not the post itself in reference to the traffic. Under the conditions, I can really see no great objections to this practice. From this point of view, I would prefer a scheme in which the dwarf signals are placed on the outside of tracks, first, because the crossover movement is generally made with engine running backward, and the signal is then in convenient location for the engineer; second, placing any kind of a signal post between the tracks is objectionable, on account of the small amount of clearance obtained; third, because the dwarf signal might be mistaken by the main line engineer for one governing his movements, it being very close to his track.

GEORGE GIBBS,
Mechanical Engineer.

Air Resistance at Very High Velocities.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Can you give me any information which will assist me in determining the resistance of bodies moving through the air at a velocity of about three miles per minute? I should like to find something, some data which would assist me in determining the resistance to be expected in the rapid transmission of bodies on wires strung on poles. There is considerable interest manifested in the matter of rapid mail and package transit by means of electromotive power, and some queer problems have come up in this connection in regard to the air resistance, etc.

Crosby, as you know, has made some experiments in connection with the Weems system in Philadelphia tending to show that the resistance increases nearly directly with the velocity, whereas the English engineers in their experiments on projectiles make out that resistance goes from the square to the cube and then back again to the square. The maximum point would seem to be at a velocity of 1,100 ft. per second, which, strange to say, is about the velocity of sound.

There might be some connection between the velocity of sound and the velocity at which a moving body would meet with the most resistance. We may imagine that for a velocity beyond 1,100 ft. per second the air would not have time to disseminate the energy of compression, but would immediately restore to the projectile part of the energy.

There have been three separate systems of electric telepherage proposed in this country, one by Weems, who uses an electric motor on the axle of the car; one by the Port-Electric Company, which uses a series of wire coils along the line which, being consecutively energized, draw along the iron carriage by induction. The third system proposed is by Maynadier, who calls it the Teleport, and it consists in a series of coils along the line and a coil on the car, the latter being connected with a source of alternate currents, and reacting upon the line coils so as to be continuously repelled, the idea being taken from the alternate current repulsion motor invented by Prof. Thomson.

As to which one will prove the successful one, if indeed any of them attain to such a point, we are very much in doubt. There seems to be very little authentic information as to what H. P. would be required to maintain a velocity of, say, three miles per minute, which is about the velocity they are aiming at. I understand that it is proposed to put a pneumatic system from Jersey City to Newark, with the intention of extending it to Philadelphia if it should prove successful. I do not think, however, that the pneumatic system has the elements of success. Think of the H. P. required to move a column of air 50 miles long through a pipe!

The "teleport" system proposes to dispense with wheels and use runners instead, the company claiming that wheels would get out of order at such a high speed.

We went out to see a trial of the Port-Electric in Dorchester, and they had no difficulty in obtaining a speed of 30 miles an hour; but apparently this was their limit.

TRANSMISSION.

Increasing Adhesion by Electricity.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have noticed in some of the railroad papers articles commenting favorably upon the scheme for increasing the traction of driving wheels by passing an electric current through the point of contact of the wheel and the rail, and it seems to me that the subject is a neglected one, and that much might be brought out by more intelligent discussion, leaving, of course, the actual practical experiment on a large scale with heavy engines to determine the real value of such a traction increaser. To evaporate a minute film of moisture on the rail, or to heat the contact surfaces to a welding heat, or to a sufficient temperature to soften the point of contact or change the coefficient of friction, at any considerable speed, would require an enormous current. It is true the electric current would probably fail of its object just when most needed, as, for instance, when the wheel was resting on a film of ice. On the other hand, it might perhaps work fairly well just at the moment of starting. Be that as it may, I am still quite confident that there can be no increase of friction due to electric effects *per se*, and the burden of proof certainly rests with those who make an assertion that such is the case, as there is nothing in the theory of electricity that will account for it.

I do not know of any way that the electrical current can increase the coefficient of friction except by one of the following phenomena:

1st. Welding or partially welding the contact surfaces together.

2d. Arcing from surface to surface owing to imperfect electrical contact, thereby roughening up both surfaces.

3d. Raising to incandescence or rupturing or decomposing insulated intermediate substances, thereby changing the frictional character of such intermediate substances.

It was the latter cause, of course, that gave rise to the increase of friction when oil was interposed as in one experiment; probably sand would have done as well or better. It seems to me, however, that whatever change there might be would be due to a change in the coefficient of friction, and therefore any increase of pressure would proportionately increase the friction, other things remaining the same; but of course the greater the pressure the better the electrical contact, and it is possible that this would very greatly vary the result. I think it quite possible that with the small surfaces in contact between the locomotive wheel and rail, the coefficient of friction could be materially increased by a welding current, *i. e.*, a current of very great volume, 1,000 to 2,000 ampères. Of course, as the resistance would be very slight the electromotive force could be correspondingly small and the energy consumed would, therefore, not need to be very great.

There are a good many enthusiasts on this subject who attempt to surround the matter with mystery by asserting that the increase of friction is due to some occult electrical phenomenon. I cannot see but what the action is purely mechanical, the electric current being simply used as a means to cause a local generation of heat as in electric welding.

The importance of this subject, if there be anything in it, is very great, as can be seen from the fact that the entire attention of the Buffalo convention of street railroad men was devoted to electric railroads and electrical improvements, with the exception, perhaps, of one small model of a cable lifting device. Only a short time since the entire time of street railroad conventions was given over to the consideration of cable roads and cable grips. From the tone of the last convention it would appear that cable roads have seen their day, and personally I believe, from the study I have made of the subject, that the equipment of the Broadway and Third avenue roads in New York will practically be the end of cable street railroads in this country. W. H.

Making and Maintaining Rates.

BOSTON, Dec. 9, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I inclose herewith a slip cut from the New York *Sun* of the issue of the 13th of November. I also inclose another editorial which I think was cut from the same paper of the same issue. I am not sure as to the editorial, but I am clear as to the slip having the name of Aldace F. Walker, Chairman. [The articles referred to give Mr. Walker's suggestions for making rates by a committee and dividing traffic, as developed more in detail in his letter published in this issue.—EDITOR.]

I wish to say in the first place that I am a railroad man of 30 years' experience, but not as a maker of rates

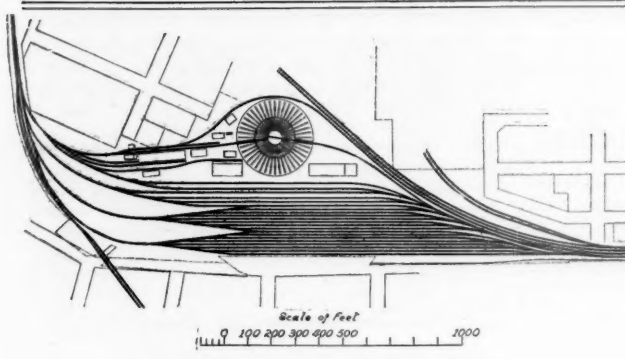


Fig. 1—Upper Yard and Round House.

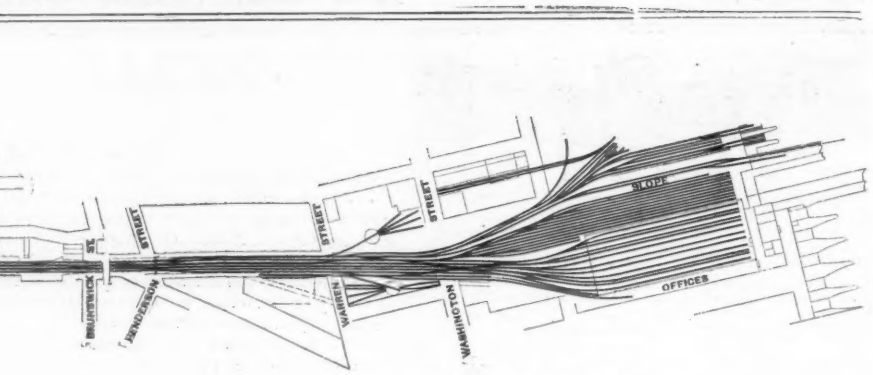


Fig. 2—Lower Yard and Train Shed.

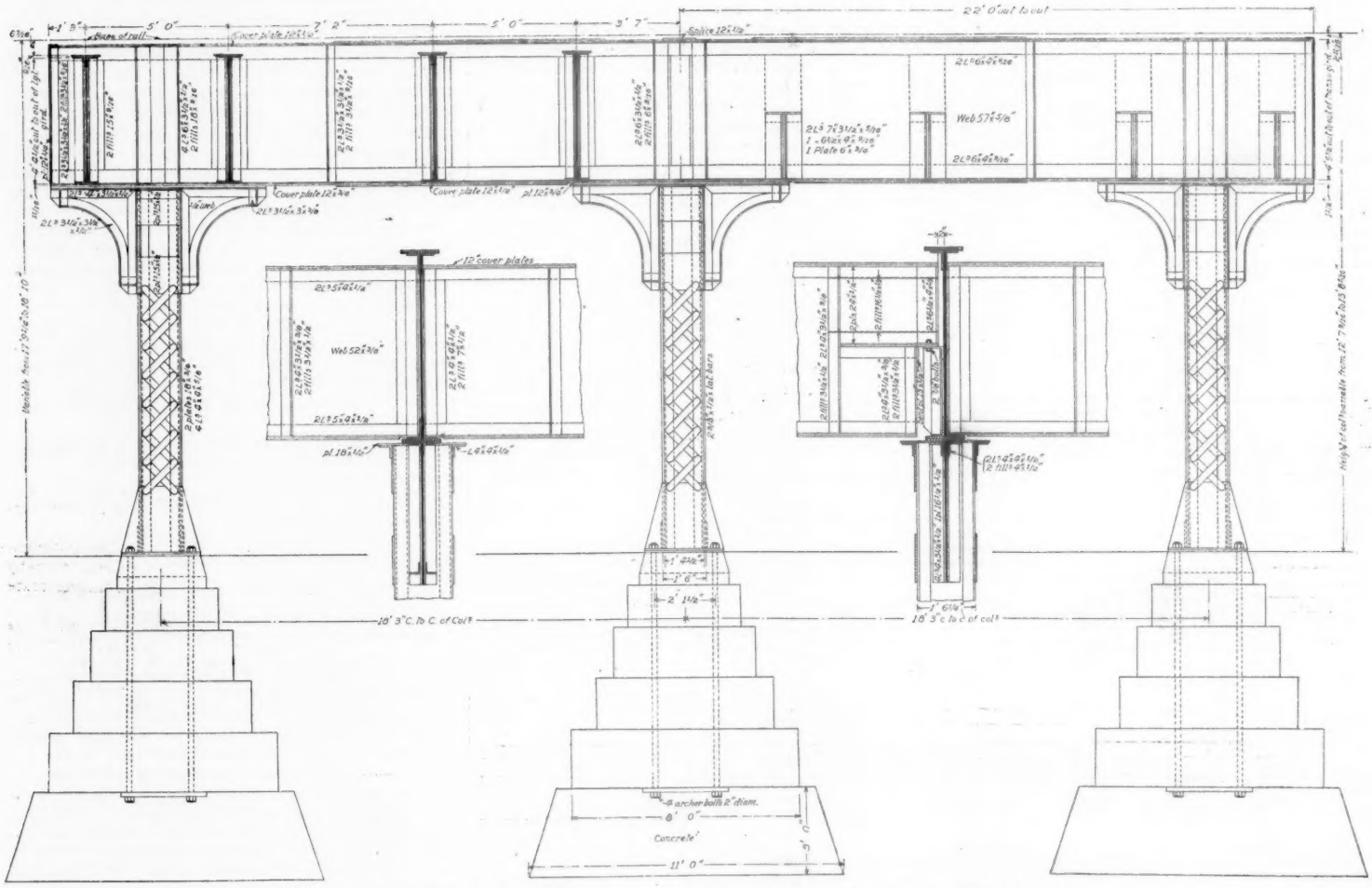


Fig. 3—Four-Track Viaduct, Transverse Section and Tight and Loose Ends of Longitudinal Girders.

PENNSYLVANIA RAILROAD PASSENGER TERMINALS IN JERSEY CITY.

nor a maintainer of rates, though I have always favored the maintaining of a paying rate. My business has been mainly trying to make something for the company I work for out of rates as made and maintained (or the contrary, as the case may be).

Mr. Walker's paper sounds wise, but that is all. To make rates, a man must be in the swim, know all the tricks of competitors, otherwise how can he meet them? It is true that the unification of interests (which sounds well, but is nevertheless impracticaole) would meet the case probably; but how will you make interests one (or make unification of interests) where there is no unity, when in fact they are antagonistic? Mr. Walker says the practical points are two, viz., the establishing of rates, and the maintaining of rates. Now, how can one power maintain rates if another power makes rates? It is simply impossible The power that makes must maintain or they will not be maintained. Mr. Walker says a chief difficulty with the present methods lies in the fact that no separation is attempted. Is any separation possible? The writer cannot see that there is any possible separation. If the power to make a rate exists, the power to make a lower and a higher rate also exists; and this being the case, where does the power to maintain rates come in?

The observer has a right to look with apprehension upon the comparison of rates and the cost of handling the business. Rates as a rule are not made with reference to the cost per ton per mile of transportation; they are simply made to get freight, and the transportation department of the railroads is looked to to make a profit on any which are made. How can a central agency meet the varied requirements of competitive business? A central board is good, but the boards of directors, or the members of boards of directors, are men who have money in the roads or represent the policy of others who have money in the roads, or control them for some purpose, and are not freight men. They are not, as a rule, posted in any department of railroad management, or the details of running a road. Of what value would be their rates, or their judgment in the rates? As a rule, of no value whatever. General freight and passenger agents are under the control of presidents and boards of directors; they will not quarrel with their bread and butter. What more do you want? There is a great cry that general freight and passenger agents are responsible for rate wars, etc, This is not true; they must be sustained by the president and board or lose their positions. If the presidents of railroads and boards of directors so will, they can stop any rate war they wish. They (the presidents and boards of directors) may desire to say that general freight and passenger agents make the lower rates; but if the rates are made too low, do they discharge the general freight and passenger agents? and if they do not, are they not responsible for what their subordinates do? As I said, I have had 30 years' experience on railroads, and these statements of mine are well understood by all railroad men.

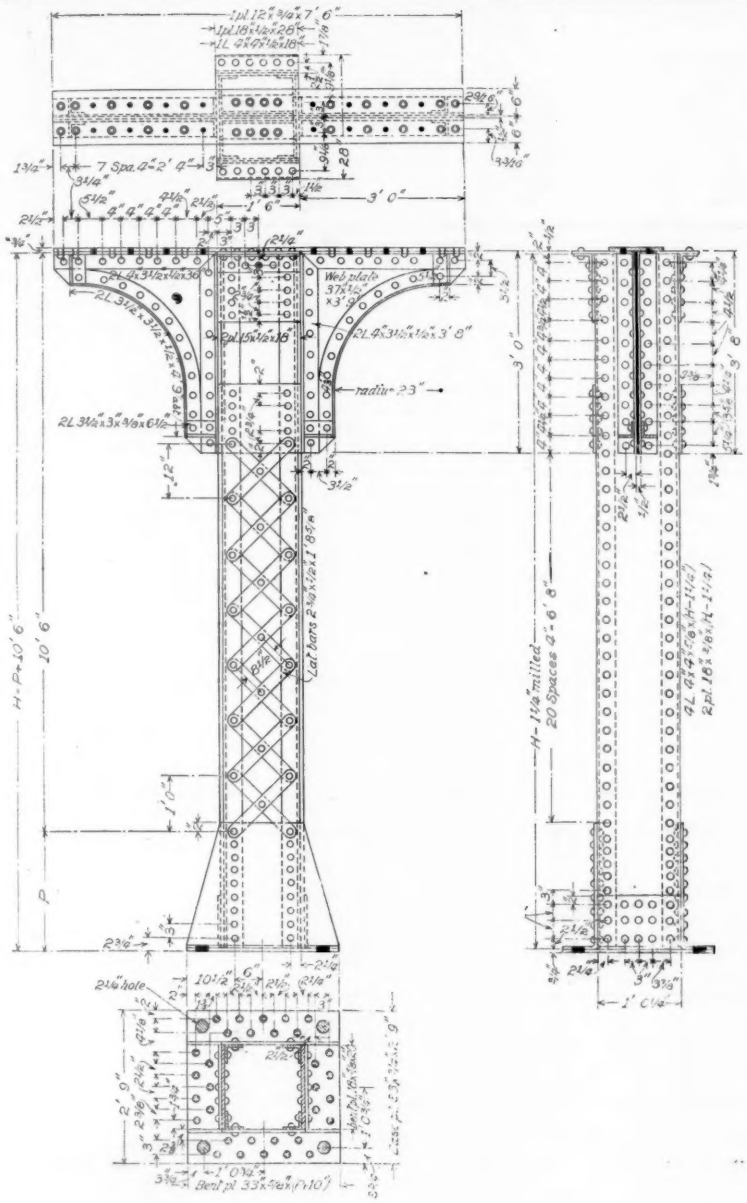
It is true that large expenses go into the solicitation of freight; and the writer believes it equally true that most, if not all, roads would be equally well off if all roads would agree not to solicit freight. But what will become of the roads who have not the best routes, and are obliged to offer inducements to get freight and passenger business to keep them alive? They will be nowhere; and human nature is so constituted that men will try to get a showing, and presidents and boards of directors of such lines will sustain them, for they have a great deal of human nature as well as their subordinates. All this central committee business sounds well, but it is the merest "rot" as long as men are men and have the ordinary frailties of human nature. If the millennium had reached this earth, and all men—and especially all railroads—were working on right principles and only looking for the right, there might be some chance for a central committee. Until this time comes such a committee may sound wise, but it is all sound and no substance. The old woman said that the streets of heaven were kept clean, because every one swept their own dooryards. In this world it is necessary (on a railroad) to look after your neighbor's dooryard or he will clean it by sweeping the dust over on his neighbor's. The only point, it seems to the writer, is for presidents and directors to study their own road, figure its statistics as to cost of transportation and stop rate makers and maintainers whenever rates are likely to get below a paying basis. If they will assert their known and acknowledged powers they will have no difficulty whatever in controlling the rates made by general freight and passenger agents, and that without a central committee or any other high-sounding nonsense of that kind.

SENEX.

The Pennsylvania Terminal Improvements in Jersey City.

Extensive improvements on the entrance of the Pennsylvania Railroad into Jersey City have been in progress for some time, and the work, as a whole, is rapidly advancing toward completion. Formerly the track in the lower part of the city was on a level with the street surface, hence there were many dangerous crossings with accidents constantly occurring. The improvements now being made will bring the trains in on an elevated structure composed partly of iron work and partly of embankment. Beginning with the upper or Bergen Hill end, we will follow the work down to the river front.

The road enters the city through a deep cut in the lower end of the Palisades. There was formerly considerable curvature in this cut, but a large amount of this has been eliminated. Work on this portion of the improvement was started some years ago. After straightening the cut quite a knoll was removed from the eastern



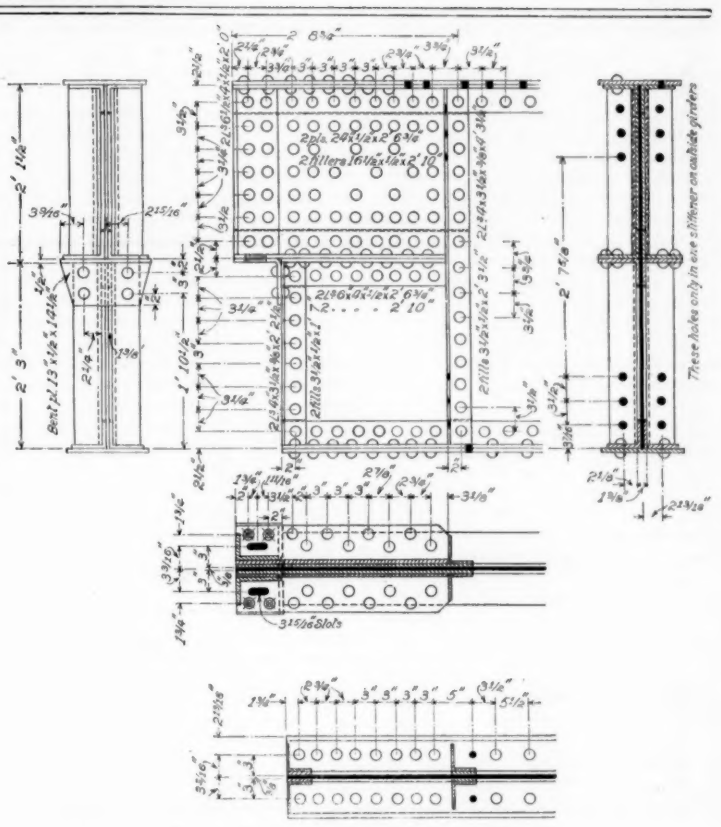


Fig. 6--Standard Drop End for Loose Seats.

DETAILS OF FOUR-TRACK VIADUCT—PENNSYLVANIA TERMINALS.

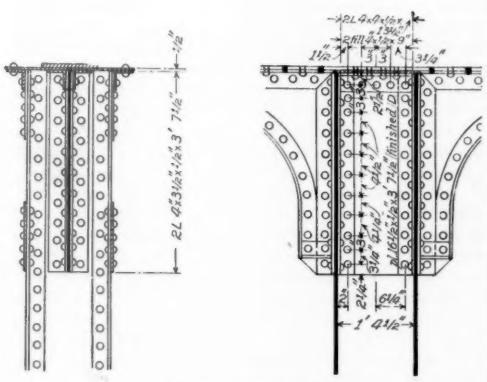


Fig. 5—Details of Standard Column.

side of the ridge and the adjacent marsh filled in with earth. This was done in order to provide yard room for the storage of passenger cars. The leveling off of the knoll required the removal of some 260,000 cu. yds. of solid trap rock. The yard thus formed (fig. 1) has a capacity of 231 cars 60 ft. long, or 248 cars 56 ft. long, as well as tracks and a shelter for 58 Pullman cars, and wash tracks for 39 passenger cars. In addition to the above there are a roundhouse of 160 ft. radius, containing 42 stalls, a store house, blacksmith and machine shops, commissary, and several other buildings included within the yard limits.

The embankment upon which the yard is built extends to Brunswick street, at which point the elevated iron structure begins. Just before reaching the iron work the tracks converge into four. The iron work is of the most substantial description, and is being supplied and erected by the Pencoyd Bridge & Construction Company. It is entirely of wrought iron, after the standard specifications of the Pennsylvania Railroad.

The foundations (fig. 3) for the outside columns of new structure on either side of the two surface tracks were built before disturbing the latter. The tracks were then moved to the north side of the street far enough to admit of placing the foundations for the centre columns. These foundations consist of four offset courses of first-class masonry, laid in cement mortar. The stone used was blue stone and brown stone, the latter of which was obtained from quarries along the line of the Belvidere Branch. The masonry rests upon a bed of concrete 3 ft. thick with a bottom surface 11 ft. square. Where the underlying strata were sufficiently solid no further provision was made to sustain the load, but where the ground was unreliable, as was the case with about one-third of the foundations, the masonry was supported on piling. Sixteen piles to a foundation were driven in four rows of four piles each. The penetration in some places was about 50 ft. The tops of the piles were cut off level and filled in with concrete. They were then capped by 12 in. × 12 in. timbers and the spaces filled in with concrete flush with the top of the caps. On top of these caps a solid floor of 12-in. timbers was laid and the masonry built on this floor. The timbers were all firmly drift bolted together. The masonry is finished off by a granite capstone 18 in. thick by 3 ft. 6 in. square.

The columns are fastened to the foundations by four 2-in. anchor bolts each. These bolts extend entirely through the masonry, between which and the heads an iron plate 1 in. thick and 3 ft. square is interposed.

After the surface tracks had been moved to the north side of the street and the foundations completed the erection of the south half of the elevated road was begun. The iron work of this half is now about completed, and tracklaying is in progress upon it. It is expected to have the regular trains running over these two tracks by March 1 of next year. As soon as this can be accomplished the surface tracks will be abandoned and the construction of the north half of the viaduct proceeded with. The viaduct is about 3,000 ft. in length, extending from Brunswick street to Henderson street. At the latter place it joins the embankment upon which the yard near the river and the train shed will be built, which will be described later on.

Some idea of the permanency and solidity of the viaduct may be obtained by a careful inspection of the accompanying engravings. Fig. 3 shows a cross-section of the structure and gives some details of the iron work. In this figure are also shown the details of the fast and loose end connections of the longitudinal girders.

In fig. 4 an elevation of a longitudinal girder, a general plan of one section, and cross-sections giving the lateral bracing are shown. Figs. 5 and 6 show the details of the columns and drop ends for loose girders. Throughout the entire work the rivets are ⅞ in. in diameter.

From Henderson street to the river front is the lower yard (fig. 2). This is built upon an embankment, the surface of which is about 14 ft. above the general street level of that part of the city. The earth will be kept in place by heavy masonry retaining walls. Neither Warren street nor Washington street will be closed, but will be crossed by iron plate girder bridges.

The storage capacity of this yard, exclusive of the train shed, will be 175 passenger cars 56 ft. long. There will also be a depressed track with a grade of 2 per cent. leading from the south side of the yard to a connection with the track along Hudson street, so that cars may be run direct to the various steamship docks.

The train shed tracks, of which there are 12, four inbound and eight outbound, have been surfaced. As soon as the two outside tracks were in proper condition the erection of an immense traveler was begun. This traveler is being used in the construction of the permanent train shed, which is carried on in 60-ft. sections.

The train shed when complete will be 600 ft. long by 256 ft. span and have a clear height of 90 ft. in the centre. It will consist entirely of iron and glass. The foundations for the shed have been finished and are now ready for the superstructure. At the end of the shed there will be two large hydraulic lifts for use in transferring the baggage from the train shed level to the present level of the ferry bridges and vice versa. Each lift will be large enough to hold an express wagon loaded with baggage. The wagons can then be run directly from the lifts to the lower deck of the ferry boats. The single deck ferry boats which are now in use will be converted into double deckers. In fact, one boat has already been so converted. The boats will be reached by double deck ferry bridges, both on the New Jersey and the New York sides of the river. The upper deck of the bridges on the New Jersey side will be on a level with the train platforms.

Immediately adjoining the south side of the train shed on the site of the old office buildings new five-story ones will be erected.

When the improvements are completed the two tracks on the north side of the viaduct will be used by the east and west bound passenger trains, and the two south side tracks by the drill trains running between the upper and lower yards.

Extensive changes will also be made on the New York side. The ferry houses will be altered to two stories in height and the present ferry bridges replaced by double deck bridges. An elevated passage way will be constructed over West street and extended to connect with the Ninth avenue elevated road on Greenwich street. Stairways will lead from this passageway to the street on the east side of West street.

Mr. Wm. H. Brown is the chief engineer of the road, and the present work is now being carried on under the supervision of Mr. E. F. Brooks, with Mr. Martin L. Gardner in immediate charge of construction. From time to time as the progress of the work warrants we hope to be able to present detail drawings of the various parts.

Preservative Treatment of Timber.

BY OCTAVE CHANUTE.

What follows is a report nearly in full of a lecture lately delivered by Mr. Octave Chanute, C. E., before the students of the Rensselaer Polytechnic Institute:

I shall endeavor to interest you this evening by talking to you on a subject, concerning which little has yet been done in this country, but which in my judgment is destined to have a considerable ap-

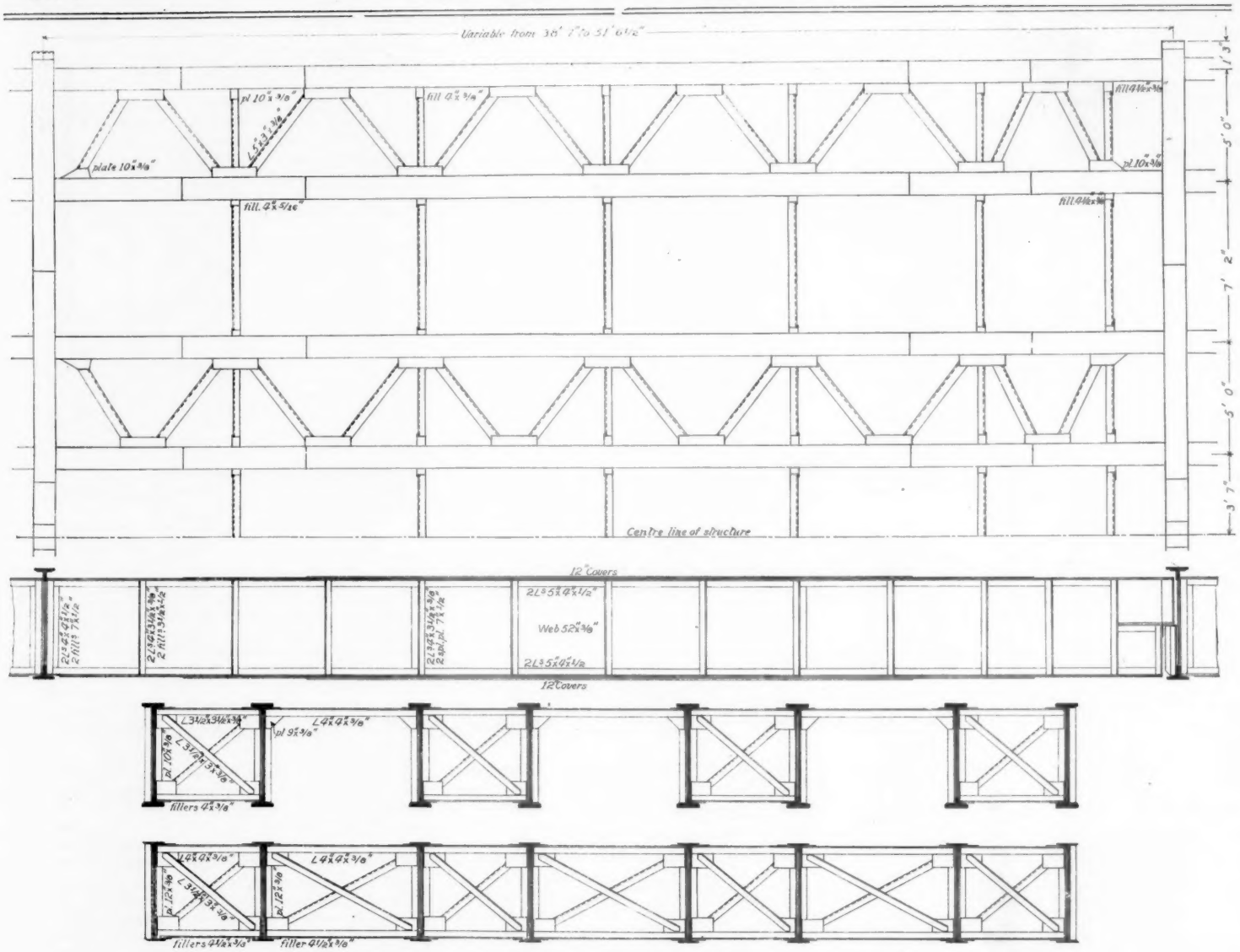


Fig. 4—Plan of Half of Floor, Elevation of Longitudinal Girder and Cross Sectional Elevations.

FOUR-TRACK VIADUCT—PENNSYLVANIA PASSENGER TERMINALS.

plication—I mean the artificial preparation of wood to prevent its decay. . . .

The prices of railroad ties, for instance, are lower now in 1890 than they were in 1882. Nevertheless, we are consuming at present at least twice the quantity of wood and twice the quantity of timber which is produced in the ordinary growth of our forests, and timber is sure to rise. It is certain that economy must be practiced, and that which is likely to be introduced first is the resorting to artificial means to lengthen its life.

Impressed with these views in 1880, the American Society of Civil Engineers appointed a committee to report on the best methods of preserving wood against decay. That committee spent five years in the investigation, and it reported in 1885 in a pamphlet, which attracted considerable attention at the time, and which it is hoped will lead eventually to economical results in this country. I had the honor of being a member of that committee, became very much interested in the subject, and I have since made it a business to promote the artificial preparation of wood, and to do what missionary work I could toward inducing the railroads and other timber consumers of this country to adopt some of the methods which have proved a success in Europe. When I visited Europe last year I took pains to investigate what is being done there, the results that had been accomplished, the various methods which had been tried and the economy that had been obtained. The present object in giving you this lecture is, first, to give you the data which have been gathered since that report to the Society of Civil Engineers, and, secondly, to indicate to you which are the best methods to follow in preserving wood, and what is the difference between good and bad work.

The preservatives that have been used have all of them been chemical in their nature; they have acted as antiseptics in preventing the fermentation of the sap and decay of the wood. Various substances have been experimented with. . . . The French writer Paulet, in his work on the preservation of timber, gives no less than 173 different methods which had been proposed by various persons for the preservation of wood. Of all those, however, which have been experimented with in the last 100 years, only four substances seem to have stood the test of time, viz.; Chloride of zinc, sulphate of copper, corrosive sublimate and creosote. These four substances, it may be said, are practically the only ones that are now being used, and of these but two are used on a large scale—creosote and chloride of zinc.

In Europe the question of economy has long since been settled. There is no longer any question as to whether a railway is to resort to wood preservation or not. It resorts to it as a matter of course. A manager who does not avail himself of it is looked upon as neglecting his duties toward his stockholders. In the United States timber has hitherto been so very cheap that it did not pay to preserve it. It was better to let it decay and renew it with new timber, because, unless the work is well done, it is nearly useless, and it cannot be well done without incurring some increased cost. The advancing price of timber, however, has reversed that condition of affairs, so that the time has now come when in many sections of the United States it will not only pay to preserve timber against decay, but pay very handsomely, and better than many other railroad improvements. Hence the only requisite to get it adopted on a large scale is to persuade the managers that success is certain if they use the right methods and do the work thoroughly well. . . .

I will explain hereafter that the time has not yet come in this country when we can resort to metallic ties with good economy, and that until we can procure metal in this country as cheaply as in England or France the wooden tie will continue to be cheaper. In England, indeed, I found last summer that although they had experimented very largely with metallic ties, the preference was now given to wooden ties creosoted. These are obtained from the Baltic ports and are invariably creosoted before being laid on the English railways. In France I found that every tie was prepared artificially to resist decay and that the principal substance used was creosote. It is injected in two ways; first, in creosoting proper, that is, by giving the heated timber a bath of creosote oil, and second by the Blythe process in which the vapors of creosote and steam are injected into the timber. I found the process of injecting sulphate of copper had been practically abandoned for ties and is now used only for telegraph poles. In Germany I found that all the various processes had been gradually giving away to two, and that creosoting and burnettizing, or the use of creosote and of chloride of zinc, may be said now to be the sole systems that prevail in Germany.

In France I was able to get accurately at the economical results which had been obtained. There are on the French railroads in round numbers 94 millions of ties; these have been renewed for the past ten years at the rate of four millions a year, or 4.2 per cent., at a cost of $2,800,000, or 70 cents each. If they had not been prepared, it is known from the consumption which had obtained prior to ten years ago that the railroads would require 10 millions of ties per year to maintain their tracks, say 10.6 per cent., which, untreated, would cost $6,800,000, or 68 cents each. Hence the economy would be four millions of dollars, less, however, a charge of 25 cents each for preparing the four millions treated, making thus a net gain of three million dollars a year by preserving these ties against decay. I have made a calculation of what the results would be in the United States on the same basis. There are, as reported to the Department of Agriculture in 1890, 515,892,918 ties in the tracks of our railroads; the repairs annually require 60,034,647 ties, or 11.6 per cent. per year. On the French basis of 4.2 per cent. per year there would be needed instead of the 60 millions but 21,672,000 ties a year, so that there would be a saving, if we accomplished the same results, of 38,362,647 ties a year. These at 35 cents apiece—which I consider a very low price—obtained by assuming that some roads get their ties still cheaper, gives a sum of $13,426,926, from which, however, we must deduct the cost of preparing the 27,672,000 ties at 25 cents, making $5,418,000, and giving a net annual economy of $8,008,926. This economy it is now in the power of the American railroads to accomplish, and when they realize it, and are well assured of success, it is quite certain that they will resort to those methods which have proved successful in Europe, and that they will call upon engineers to design, build and operate various wood preserving works.

I found that some experiments were being tried occasionally abroad with other substances, but that the field had been gone over so thoroughly that there is but little hope of finding any new substance which will be better or even as good as the old. I had heard before leaving home of the experiments of a gentleman in Rome, who had been treating some ties with arsenic, and when I was in Rome I investigated these ties. They had been laid 10 years, and I found that the results were not any better than those that had been obtained with other mineral salts.

Some new experiments are being tried in this country. I may mention notably that of "vulcanizing" wood by inclosing it in iron cylinders, subjecting it to a heat from 400 to 600 degrees at a pressure of 200 lbs. to the square inch, and thus, as it is claimed, partly distilling the sap which is in the wood and transforming it into various antiseptics; but my judgment is that, although the process is a good one to season the wood, it will not be found sufficient to preserve it permanently against decay, because all testimony goes to show that

the germs of decay must be poisoned to prevent the fermentation of the sap and the eventual decay and destruction of the wood. . . .

Of one thing we are certain, that the conditions of decay are four in number: First, there must be moisture, and that moisture must not amount to total immersion, for if the timber is entirely submerged in water it will not decay. Second, there must be access to oxygen for fermentation to take place; Third, the temperature must be between 32 degrees and 150 degrees; below freezing point no decay takes place; above 150 degrees no fermentation takes place; Fourth, there must be present the germs of decay, and they must be active; if they are poisoned by one of the mineral salts or by creosote the decay does not take place. It is also known, and that you will find pretty broadly set forth in the report to the American Society of Civil Engineers, that the particular process to be selected depends upon the intended subsequent exposure of the wood. If the situation be salt water or very wet, creosote is undoubtedly the proper substance to use. If it be a wooden bridge or a fence, it is probable that the best results would be obtained by the use of corrosive sublimate. If the exposure is that of a telegraph pole, it may be said that the French still use the sulphate of copper; but if the exposure is to be that of a railroad tie, the experience of the Germans and in the United States seems to point to chloride of zinc or burnettizing as the proper method to use. The requirements for ties, as you know, comprise the largest consumption of wood in this country.

It has been proposed to substitute metal, and there is no doubt in my mind that the time will come within a generation when the tracks of our railroads will be largely laid with metallic ties. At present, however, it has been found that in order to have a tie strong enough to resist the wear it must be made so thick and heavy that it can not be put down for less than $2.50 each. If the money for this be borrowed at 5 per cent., then the annual interest charged upon the first cost will amount to 12½ cents a year, which is more than the present cost of the unprepared wooden ties. Thus an oak tie will cost about 70 cents and will last about seven years. It costs, therefore, about seven cents a year a tie, as against 12½ cents interest on the metallic tie. And again, if we use a hemlock tie which would cost unprepared 35 cents, and can be chemically prepared for 20 cents more, making 55 cents, it will then last about 12 years, making its cost 4.5 cents a year a tie, or a good deal less than either the oak tie or the interest upon the metallic tie. It is clear, therefore, in my mind that present economy in this country is going to lie in the preparation of the inferior and cheaper kinds of wood. A selection, therefore, should be made of those which are most open grained so as to receive a large dose of the chemicals used and which are at the same time hard so that they shall not be cut and pounded to pieces by the foot of the rail.

You will find, if any of you ever engage in this business, that the principal difficulties you will have to contend with will be in consequence of the difference between the various kinds and qualities of wood, and that you will have to make many experiments in order to ascertain which wood is best for a particular purpose, and what is the best mode of treating it. Thus I have a record before me of a number of experiments which I have made. One set was made in July, 1886, with a lot of hemlock ties, which had been cut for two years, which were treated at the works of the Union Pacific Railway at Laramie. There were two lots of 35 ties each. They were weighed before they were charged in the cylinder, and again after they came out, the difference in their weight indicating the amount of solution which they had absorbed. That tie which increased the least in weight weighed 13 per cent. more when it came out than when it went in, that tie which increased the most gained 80 per cent. These ties ranged all the way between these limits. Here there was a lot of timber ties which had been cut at the same time from the same forest, seasoned in the same way, which showed such difference in the character of the wood as to absorb all the way from 13 to 80 per cent. of its weight. Again, last week a similar experiment was made for the Illinois Central Railroad at Chicago with the zinc tannin process. The Illinois Central managers wanted to know whether the timber growing along the line of its road would properly take the treatment, so they sent a number of ties of various kinds of wood. There were four ties of pin oak which took from 8.6 to 12.3 per cent. of their weight of solution; there were four ties of red oak which took from 13 to 21 per cent. of their weight; there were four ties of black oak which took from 15 to 21 per cent.; there were four water oak, which took from 17 to 40 per cent.; there were two beech ties which took from 9 to 10 per cent. only, while the French beech, as a rule, takes 28 per cent. There were two ties of sweet gum which took 4 to 5 per cent. only, while there was a maple tie which took 57½ per cent. of its weight; two black gum ties which took 30 and 40 per cent. respectively; two cypress absorbing 48 per cent., and one red elm which took 45 per cent., while two hickory ties which took but from 3.7 per to 5.7 per cent., etc. So that you see that there is an enormous difference in the receptivity of the various woods, and that in order to do good work it is necessary to ascertain which woods will accept the treatment best.

It is also necessary to promote their receptivity so as to put them in the best condition. First, by cutting them at such time of the year when they will contain the least sap. It is for that reason that railroad ties in the north are purchased in the winter; there is then less sap and larger space in the sap cells for the reception of the chemicals which are to be injected. There is a different practice to that in the extreme south, where it is found best to cut some varieties of wood in the summer, and the reason given therefore is that in consequence of the drought of that time of the year there is less sap in the wood. Moreover, in order to inject the chemicals properly, the timber should be seasoned, the moisture needs to be evaporated, so that the voids in the sap cells shall be the greatest possible. The French have tried a great many experiments and I have some before me. Thus with elm they found that when it was fresh cut it would absorb 26 per cent. of its weight of solution, but when it was well seasoned it will absorb 69 per cent. Beech, when fresh, will only absorb 21 per cent., and when seasoned it will absorb 47 per cent. of its weight. The French poplar will absorb 27 per cent. when green and 59 per cent. when seasoned. So it is evident that in order to inject the chemicals properly, trees should be cut at the right time and then should be properly seasoned.

The process which seems to be best adapted for ties in this country is that which uses chloride of zinc. It has been found by the Germans that it needs of this salt one quarter of one per cent. of the weight of the wood when dry in order to effect an actual preservation. We are in the habit at the works with which I am connected of injecting twice that quantity, because of the difference found to exist between the individual trees, some absorbing more than others, and so, in order to make sure that there shall be a quarter of 1 per cent., one half of 1 per cent. of the weight of the wood of the salt is injected. The important factor, as I have said, is to have the wood in the right condition.

It has been found by experience that the proper rate of absorption varies with the different antiseptics. For creosote ties it requires 10 lbs. to the cubic foot, which amounts to 833 lbs. per thousand feet of board measure, but for preservation against the teredo from 15 to 19 lbs. to the cubic foot should be injected. For sulphate of copper French specifications require that the solution should be 2 per cent. strong, and that the amount of salt injected should be .34 of a pound per cubic foot. For chloride of zinc the solution should be 1 to 2.5 per cent. strong, and the quantity absorbed should be 0.26 lb. to the cubic foot, or 21 lbs. per thousand. For corrosive sublimate there should be about 0.06 lb. per cubic foot, but that minute quantity is such that if the wood is exposed to moisture the salt will wash out more than the other salts which I have mentioned.

One difficulty is that there is no method of testing whether the work is thoroughly well done except with the use of sulphate of copper. In that case a solution of ferro-cyanide of potassium, applied with a brush to the timber, indicates by the resulting discoloration the amount of copper absorbed. For the other substances the only method is chemical analysis or that of gauging at the works the quantity which is being injected by reading the indicators at the tanks; and I can best explain how that is done by describing the operation as performed with chloride of zinc at the works in Chicago. The timber treated there is hemlock, which has been cut generally from one to six months when it arrives at the works. The works consist of two cylinders 111 ft. long and 6 ft. in diameter, in which a track is laid; on this small cars run which are loaded with the ties. Thirteen cars go in the cylinders, carrying from 350 to 400 ties. After these are inserted the door is hermetically sealed by being pressed hard on a rubber gasket which is laid into the flange against which the door closes. Then steam is admitted to the inside of the cylinder, and it takes 30 minutes to obtain a pressure of 18 lbs. to the square inch. Beyond that pressure it is not best to go, because if greater heat is applied the fibre of the wood is injured, and it has been found that not much more than 18 lbs. is safe to work with. Then steam pressure is then maintained for a period of three hours, the result being to gradually warm up the wood and liquefy the sap, so as to put it in such a condition that it is most readily extracted by the next operation. That consists of blowing off the steam and then working a vacuum pump in order to reduce the pressure, when the heated air which is inside of the sap cells of the wood expands and drives out a considerable quantity of sap; this falls into the bottom of the cylinder and is pumped out. At that stage of the operation there is a decided smell of vegation coming from the sap, the object of all this being to open the pores of the wood and to make a place where the preservative solution may be injected. Then the valves are opened and the preserving solution is admitted, this occupying about 30 minutes. The wood immediately drinks up a quantity of this solution, but that absorption gradually slows up and then pressure is put on, carried to 100 lbs. to the square inch, and that pressure is kept up by a few strokes of the pump, as absorption proceeds, for a period of three hours. Then the chloride solution is expelled from the cylinder by pumping in air at the top, and it is thus forced back into the tanks; this occupies 20 minutes, at the end of which time a second solution of tannin is admitted, this occupying 15 minutes; then pressure is put on the solution of tannin for the space of two hours. The reason of this second injection is this: The first solution of chloride of zinc is mixed with a small quantity of glue, and that glue coming in contact with the second solution of tannin produces small pellicles of artificial leather, which act as diaphragms for the sap tubes, and thus prevent the zinc from being washed out. That is the theory, at any rate, and the experience in the last five or six years seems to substantiate it. The exact value of this process, however, will be better known five or six years hence than it is now. After the tannin solution is forced back, which occupies 20 minutes, the cylinder is then opened and is discharged in 20 minutes, the whole treatment occupying 12 hours; the 400 ties mentioned absorbing generally about a gallon and a half of solution to the cubic foot.

The quantity absorbed is obtained as follows:

Each cylinder is accurately gauged with 13 empty cars in it, and by reading the gauges on the solution tub at the lowest point reached, just before the surplus solution is forced back out of the cylinder, and also after it is all forced back, the displacement of each load is ascertained, and thus the number of cubic feet of ties in the cylinder is known.

The solution tank being also gauged by observing the reading both before and after each run, the total cubic feet of solution absorbed by the charge is also ascertained, and the strength being known, it is easy to compute the amount of pure chloride absorbed.

We find in Chicago that there are great differences between various cargoes of ties as they arrive. These come by lake from different points on the lakes, and they are found to absorb different quantities of solution, so that whenever a new cargo comes in its condition is ascertained by experiment and then the strength of the solution is gauged, so that at all times about the same quantity of metallic salt shall be injected. It is also found that there is a great difference in the condition of the wood between the various months. Those ties which arrive in the early part of the year, require a stronger solution than those that arrive in the fall. The latter absorb the solution more readily and the solution may then be weakened with advantage; for the weaker the solution, provided the necessary quantity of the salt be injected, the better is the result. So changes are constantly made in the strength of the solution in order to inject uniform quantities of chloride of zinc.

The desirable thing, if it could be done, would be to inject a metallic salt in solution with petroleum oil or some similar substance which would repel moisture. I investigated at the time of preparing the report to the American Society of Civil Engineers the effect of applying petroleum to wood. I found that when wood was constantly saturated by petroleum, it proved an effective preservative, but that petroleum is so volatile, that if the wood was merely injected once, and no more was applied, the petroleum would evaporate; if a solution could be injected consisting of chloride of zinc or of mercury with petroleum, the mineral salt would then poison the germs of decay, while the petroleum would prevent the intrusion of moisture and probably better results could be had than with any antiseptic except creosote, which latter is unfortunately quite expensive.

That brings me to tell you the cost of these various treatments. The cost of treatment with bichloride of mercury has been about 10 cents per tie on the Eastern Railroad of Massachusetts, but that did not provide for a sufficiently strong injection to do much good, so that the road, after working the process for five or six years, abandoned it upon finding that they did not get their money's worth. The cost of treatment with sulphate of copper would be about 24 cents per tie. It has been used to a very small extent in this country; it has not succeeded and it is not recommended. The cost of treatment by chloride of zinc is about 20 cents per tie. It can be done in different localities from 18 to 20 cents a tie, while the cost of treatment with creosote, which is the method used in France and England, if well done, would be about 60 cents a tie. I may explain that, in this country the normal price of creosote is eight cents a gallon, while in England it is but four cents, there being a greater demand for coal tar for roofing purposes in this country than in England, so that when the wood-preserving works want a supply they have not always obtained it at home. The supply of creosote is, moreover, growing less every year by reason of the diminishing quantity of coal used for making gas and by the substitution therefor of water gas, which is charged with some product of naphtha as an illuminant. Therefore, while the creosote process, as an independent proposition, is the best in use, it is not the most economical. It will probably lengthen the life of a wooden tie to about 20 years at a cost of 60 cents, while at a cost of 20 cents we can lengthen the life of the same tie with chloride of zinc to 12 or 16 years. Therefore, so long as timber is so cheap in this country, it will be preferable to use the cheaper preservative.

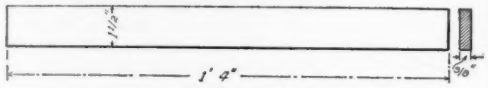
Care should be taken after the ties are prepared to allow them to dry before they are laid. They should be piled up about two or three months, so that the moisture may be evaporated from them and leave only the preservative substance in the wood, so that it shall be in the best condition to resist a fresh intrusion of moisture,

They can be marked for record in one or two ways, either by stamping an indentation at the end, or, as the Germans do, by driving in a nail with the year of its preparation in raised letters on its head, which nail is galvanized or dipped in zinc in order to prevent it from rusting. In that way, upon inspection, the year in which the tie was prepared is at once seen, and the decay and wear is accurately known.

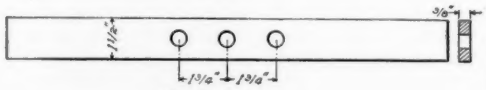
It is very important in laying these preserved ties that the roadbed should be well drained, so that moisture shall not accumulate about the wood to promote the beginning of decay. It has been found, however, as reported in the last bulletin of the Department of Agriculture, that in endeavoring to drain the roadbed thoroughly we may encounter another danger—the tie is cut and pounded by the rail when laid on rigid rock ballast – so that it is destroyed by abrasion instead of being destroyed by decay. All these points naturally will come up and have to be studied, and I trust that such of you as may hereafter be entrusted with the doing of such work will ascertain more fully than I have done all the various conditions of success and will be enabled to do still better work than which is now being carried on in this country.

Effects of Punching and Reaming Iron and Open Hearth Steel.

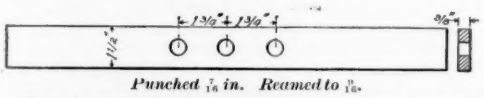
The experiments, the results of which are given in the two accompanying tables, were made by the Passaic Rolling Mill Company, under the direction of Mr. Geo. H. Blakeley, Chief Engineer, to determine the effects of punching and reaming steel as compared with iron. The tests were all made on the same sized specimens throughout. Each set, consisting of six pieces, 2½ in. in width, was cut from the same plate and as close together as possible. After the specimens were planed to 1½ in. in width, two of them were punched with holes $\frac{3}{16}$ in. diameter, and two were punched with holes $\frac{7}{16}$ in. diameter and reamed to $\frac{3}{16}$ in. diameter.



Plain.



Punched $\frac{3}{16}$ in.



Punched $\frac{7}{16}$ in. Reamed to $\frac{3}{16}$.

The six specimens were then tested, two of them plain, two punched and two reamed. Eight sets of such specimens were prepared and tested, four of them being cut from iron plates and four from steel plates. The separate results for each specimen are shown in the first table.

The second table gives the average results for elastic limit and ultimate strength for each set, and the last four columns show the change in per cent. produced in the elastic limit and ultimate strength per square inch of the punched and reamed specimens as compared with the plain specimens.

Referring to the table, it will be seen that the limit of elasticity was increased by punching 5.9 per cent. in the iron specimens and 6.5 per cent. in the steel specimens. This increase in elastic limit is due to the hardening of a small ring, immediately adjacent to the hole made by the punch, making it brittle, and is consequently of the nature of an injury done to the metal, rendering it more liable to rupture by sudden shocks. This injury becomes apparent when the piece is tested to destruction, when the small ring of affected metal, being harder, stretches less, and consequently gives way before the ultimate strength of the unaffected metal is reached. The hardening effect of punching is a well-known phenomenon, but it will be noticed that these steel specimens were but little more affected than the iron ones in this respect. When the ultimate strength per square inch is considered, the injury done by punching was far less to the steel specimens than to the iron ones. The effect upon the steel being only a reduction of 4.5 per cent., while the iron specimens suffered a reduction of 16.8 per cent., or nearly four times as much. The reamed specimens of iron failed to reach the ultimate strength per square inch of the plain specimens by 6.6 per cent., while the reamed steel specimens exceeded in ultimate strength 1.9 per cent. of the plain steel specimens. This excess in ultimate strength is due to the constraining of the flow of the particles of metal, which occurs before rupture takes place, and it is noticed in all tests of specimens like these where there is a sudden contraction of area over a small distance only. It is evident that the reaming of the steel specimens, though it did not entirely remove the hardening effect produced by the punching, as it failed to bring down the elastic limit to that of the plain specimens, took away sufficient to enable the ultimate strength per square inch of net area of the reamed specimens to exceed that of the plain specimens. The contrary was true of the reamed iron specimens.

TABLE OF TESTS

MADE ON PLAIN, PUNCHED AND REAMED SPECIMENS OF IRON AND OPEN HEARTH STEEL.

	Material.	Specimen cut from	Mark.	Nominal section of test piece.	Condition of specimen.	Actual area of test piece sq. in.	Limit of elasticity lbs. per sq. in.	Ultimate strength lbs. per sq. in.	Per cent. of elongation in 8 in.	Per cent. of reduction of area.
Set No. 1. Cut from same piece.	Iron.	15″ × ⅜″	1_I	1½ × ⅜	Plain.	.513	28,700	48,000	18.1	26.6
	"	"	1_{II}	"	"	.514	28,600	51,300	21.3	28.0
	"	"	1_{III}	"	Punched $\frac{3}{16}$ in. holes	.316	31,600	39,200	1.9	14.6
	"	"	1_{IV}	"	" " "	.316	32,900	40,800	1.9	11.4
Set No. 5 Cut from same piece.	"	6″ × ⅜″	5_I	"	Plain.	.526	25,800	49,400	12.8	49.5
	"	"	5_{II}	"	"	.520	26,500	49,400	13.5	47.7
	"	"	5_{III}	"	Punched $\frac{3}{16}$ in. holes	.324	27,800	40,700	1.9	16.0
	"	"	5_{IV}	"	" " "	.324	26,800	39,500	1.9	13.3
	"	"	5_V	"	Reamed $\frac{3}{16}$ in holes	.331	25,600	46,200	3.8	17.0
	"	"	5_{VI}	"	" " "	.322	26,100	47,200	3.8	17.8
Set No. 6. Cut from same piece.	"	12″ × ⅜″	6_I	"	Plain.	.563	24,000	51,900	16.0	25.0
	"	"	6_{II}	"	"	.561	25,000	48,800	17.0	25.3
	"	"	6_{III}	"	Punched $\frac{3}{16}$ in. holes	.361	25,000	44,000	1.5	11.9
	"	"	6_{IV}	"	" " "	.338	25,100	40,200	1.4	9.8
	"	"	6_V	"	Reamed $\frac{3}{16}$ in. holes	.356	23,300	45,500	3.1	17.4
	"	"	6_{VI}	"	" " "	.348	24,400	48,900	2.5	17.0
Set No. 7. Cut from same piece.	"	18″ × ⅜″	7_I	"	Plain.	.531	26,000	50,100	16.0	22 4
	"	"	7_{II}	"	"	.530	26,400	47,900	14 0	19.0
	"	"	7_{III}	"	Punched $\frac{3}{16}$ in. holes	.327	27,200	41,660	1.3	10.0
	"	"	7_{IV}	"	" " "	.327	27,500	44,000	1.3	5.2
	"	"	7_V	"	Reamed $\frac{3}{16}$ in. holes	.341	26,400	44,000	2.0	13.5
	"	"	7_{VI}	"	" " "	.344	25,360	46,200	2.0	13.9
Set No. 2. Cut from same piece.	Steel.	11″ × ⅜″	2_I	"	Plain.	.546	30,000	73,100	16.7	48.6
	"	"	2_{II}	"	"	.547	31,100	74,000	20.0	46.0
	"	"	2_{III}	"	Punched $\frac{3}{16}$ in. holes	.332	33,100	73,500	3.1	15.4
	"	"	2_{IV}	"	" " "	.335	31,600	71,300	3.5	14.0
	"	"	2_V	"	Reamed $\frac{3}{16}$ in. holes	.340	31,200	74,400	5.0	29.4
	"	"	2_{VI}	"	" " "	.338	33,000	74,800	5.6	34.0
Set No. 3. Cut from same piece.	"	16″ × ⅜″	3_I	"	Plain.	.573	29,700	66,200	22.8	46.4
	"	"	3_{II}	"	"	.571	30,200	66,100	23.1	49.0
	"	"	3_{III}	"	Punched $\frac{3}{16}$ in. holes	.345	30,400	60,800	3.8	17.7
	"	"	3_{IV}	"	" " "	.346	31,300	63,700	4.4	19.6
	"	"	3_V	"	Reamed $\frac{3}{16}$ in. holes	.357	28,500	65,900	5.6	30.2
	"	"	3_{VI}	"	" " "	.342	29,900	68,400	5.0	30.8
Set No. 4. Cut from same piece.	"	18″ × ⅜″	4_I	"	Plain.	.593	31,200	73,500	19.4	46.2
	"	"	4_{II}	"	"	.596	32,500	72,700	21.3	44.5
	"	"	4_{III}	"	Punched $\frac{3}{16}$ in. holes	.360	34,700	70,600	2.5	16.6
	"	"	4_{IV}	"	" " "	.363	35,700	70,000	2.5	17.6
	"	"	4_V	"	Reamed $\frac{3}{16}$ in. holes	.373	34,800	76,400	4.4	26.8
	"	"	4_{VI}	"	" " "	.368	36,700	76,100	4.0	38.2
Set No. 8. Cut from same piece.	"	15″ × ⅜″	8_I	"	Plain.	.560	31,300	67,100	20.0	46.6
	"	"	8_{II}	"	"	.566	31,500	66,600	23.5	51.2
	"	"	8_{III}	"	Punched $\frac{3}{16}$ in. holes	.338	32,500	62,100	3.1	25.5
	"	"	8_{IV}	"	" " "	.342	34,000	62,900	2.9	25.3
	"	"	8_V	"	Reamed $\frac{3}{16}$ in. holes	.352	31,200	66,800	6.3	29.0
	"	"	8_{VI}	"	" " "	.357	32,500	67,200	5.0	28.6

EFFECT OF PUNCHING AND REAMING UPON THE ELASTIC LIMIT AND ULTIMATE STRENGTH OF IRON AND OPEN HEARTH STEEL.

Material.	No. of set.	Limit of elasticity, lbs. per sq. in. [Average of each set].			Ultimate strength, lbs. per sq. in. [Average of each set.]			Per cent. of change in limit of elasticity.		Per cent. of change in ultimate strength.	
		Plain.	Punched.	Reamed.	Plain.	Punched.	Reamed.	Punched.	Reamed.	Punched.	Reamed.
Iron.	1	28,650	32,250	....	49,650	40,000	....	+12.6	....	−19.4	....
"	5	26,150	27,300	25,850	49,400	40,100	46,700	+ 4.4	−1.5	−18.8	−5.5
"	6	24,500	25,050	23,850	50,350	42,100	47,200	+ 2.2	− 2.7	−16.4	−6.3
"	7	26,200	27,350	25,850	49,000	42,800	45,100	+ 4.4	− 1 3	−12.6	−8.0
					Average of experiments on iron.			+5.9	−1.8	−16.8	−6.6
Steel.	2	30,550	32,350	32,100	73,550	72,400	74,600	+ 5.9	+ 5.1	−1.6	+1.4
"	3	29,950	30,850	29,200	65,150	62,250	67.150	+ 3.0	− 2.5	−5.9	+1.5
"	4	31,850	35,200	35,750	73,100	70,300	76,250	+11.0	+12 2	−3.8	+4.3
"	8	31,400	33,250	31,850	66,850	62,500	67,000	+ 5.9	+ 1 4	−6.5	+0.2
					Average of experiments on steel.			+6.5	+4.1	−4.5	+1.9

Westinghouse Air Brake Equipment in North America.

The figures below show very accurately the number of locomotives and cars in United States, Canada and Mexico equipped with Westinghouse air brakes to Dec. 1, 1890:

Engines (approximately) equipped with the Westinghouse automatic brake	22,000
Passenger equipment cars equipped with the Westinghouse automatic brake	35,000
Passenger equipment cars (included in above) fitted with quick action automatic brake since December, 1887	5,300
Freight equipment cars fitted with old style automatic brake	56,100
Freight equipment cars fitted with new style quick action automatic brake, and supplied since December, 1887 (*including orders in hand*)	100,000
Total freight equipment cars, automatic system	156,100
Freight equipment cars equipped with straight air brake	6,900
Total freight equipment cars equipped with brakes	163,000

Below is a graphical illustration of the progress made in the application of the Westinghouse automatic air brake to freight cars since its inception:

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	24,036	101,576
1890 (Dec. 1)	48,485	150,061

One hundred and fifty thousand and sixty-one freight cars fitted with the Westinghouse automatic brake, which is almost 15 per cent. of the entire freight car equipment of the United States.

The New Michigan Central Compound.

We have the following information from Mr. C. E. Smart, General Master Mechanic of the Michigan Central Railroad concerning the compound locomotive just delivered to that road. The engine is substantially the same design as the other compound in service there, being of the ten-wheel pattern. The design of the boiler is somewhat different, being of increased size, and having radial stays instead of crown bars. The boiler also has increased heating surface and steam room, on account of extending the wagon top well forward.

A new pattern was made for the driving wheels, of increased diameter; the first compound having drivers outside diameter 68 in., while the new compound has 74-in. wheels. The size of the truck wheels has been increased also to 33 in. The driving boxes are of solid bronze; driving springs underhung throughout.

This engine was received from Schenectady a few days ago and was immediately put in service on the Canada Southern Division of the Michigan Central, and thus far is working admirably, having run under steam from Schenectady to St. Thomas. We have had her for four trips in freight service breaking her in, and hope in a very few days to have her in passenger service, when we can determine as to her capacity for economy, pow and speed

A Boltless Steel-Tired Wheel.

The subject of fastenings for steel-tired wheels has recently received considerable attention, particularly from members of the Western Railway Club. The paper on Steel Tires and Fastenings, by Mr. G. W. Rhodes, was published in the *Railroad Gazette*, Nov. 7, and some discussion, with illustrations of many of the forms of fastening now in use, appeared in our issue of Dec. 5. It will be remembered that Mr. Rhodes' conclusion was that the tire fastening should be "one which is circumferential with the tire, and not at right angles to it, as well for locomotive drivers as for truck or car wheels." This conclusion is based upon the liability of any form of fastening which depends upon bolting to shearing of the bolts. As a direct contribution to this discussion we show herewith the Snow Boltless wheel, made by the Ramapo Wheel & Foundry Company.

Fig. 1 shows the tire finished and ready for the centre; fig. 2 shows the manner of fastening the tire to the centre. When the tire has been heated and the centre placed in position the retaining ring (which may be in one or more pieces) is inserted in the groove and held by a simple clamp or dog while the lip on the tire is struck on each side by a hammer, and this is repeated every six inches until the whole ring has been inserted and fastened in the groove. The ring is left a little longer than required, and is cut off at the end to make the

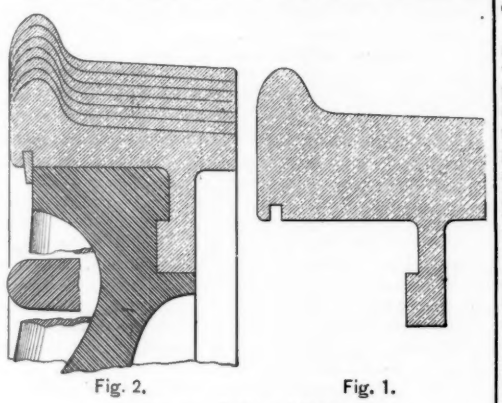


Fig. 2. Fig. 1.

Snow's Boltless Wheel.

connection complete and exact when the last blow is struck by the hammer; this completes the operation of fastening the retaining ring in position.

The wheel is lifted while the tire is still hot to a small power spring hammer which strikes several hundred blows per minute, which completes the work. This may be done with ordinary blacksmith hammers, and would ordinarily be by those who re-tire their own wheels; but where many are being made there is economy in the use of the power hammer. Besides, the power hammer leaves a smooth finish on the lip of the tire.

Where a new tire is required for the wheel the lip is turned off and the retaining ring released to serve the same purpose for the new tire.

It will be observed that this fastening is circumferential with the wheel, and has no bolts to wear out or shear off.

Fewness of parts is a very desirable feature in a steel-tired wheel. This wheel has virtually but two parts, as the retaining ring becomes a fixed part of the tire when fastened as described. The tire has the usual shrinkage as adopted by the Master Mechanics for driving wheels, making a thoroughly rigid wheel, and one in which the tire is supported by the solid centre. The broad internal flange of the tire acts to prevent the stretching and consequent loosening which is incident to a plain section of tire when worn thin. The internal flange is carried forward and away from the line of rail-wear, giving the full benefit of the power of the rolls at that point, causing greater density of the steel and consequent longer life in service. The tire mills find it necessary to do more forging on this section of tire in order to form the internal flange, and this, of course, is beneficial.

The principal feature of this device, with the hook on the tire and beveled retaining ring, is the assurance that the tire will be securely held to the centre until worn too thin for further service; and should the tire be broken it cannot leave the centre. This fastening appears to have the advantages of the Mansel retaining ring without its dangerous features, and it is claimed that the tire can be worn much thinner than one with the Mansel ring. It commends itself by its simple construction. It can be re-tired in any machine shop without special appliances, and when worn out there is nothing to renew but the tire, the centre and retaining ring remaining as good as new.

Report of the Interstate Commerce Commission.

Advance sheets of the fourth annual report of the Interstate Commerce Commission have been received. Appendices containing statistical information and special reports in detail have not yet been issued. An abstract of the substance of the report follows:

The report opens with a review of the work of the Commission for the year. The controversies which have been disposed of are given by abstract in an appendix. These controversies represent but a small portion of the work of the Commission, the greater part of which ends with correspondence or with bringing managers and patrons together.

The opposition to the law as oppressive to carriers or to localities appears for the most part to have been abandoned, and it is thought likely, either in its present or in a modified form, to continue a part of the permanent policy of the country.

To outward appearances the law seems, in the main, to have been observed, at least so far as could be expected of a new law which undertakes the regulation of so immense a business. In the publication and filing of rates there has been, however, very great carelessness. The public has been left to inquire of agents what rates are, and there is reason to believe that in some cases this has been purposely done, particularly with passenger rates, in order to give opportunities for illegal dealing with scalpers. The railroad associations have been unable to break up this class of dealings.

There is reason to believe that the provisions directed against unjust discrimination have been directly disobeyed or evaded in a great number of cases in all sections of the country where competition is not held in restraint by the railroad associations. There are no less than 68 associations in the country, but their combined efforts exert little, if any, influence upon the action of carriers in preventing rate wars, secret concessions and other demoralizing practices.

The Commission holds that prosecution of offenders for violations of the law are a necessary means for preventing such violations, but the enforcement of the penal provisions of the statute must be left largely to the parties injured, or to the public authorities in sections where the violations occur. Had the Commission power to make and conduct investigations through agents having authority to call for records and papers, it could more effectually enforce the law than now. In any efforts made to enforce the law in penal prosecutions, the difficulty of making proof is beyond what is encountered in other cases of criminal violations of law. The most frequent violations of the law are in giving rebates, or granting special rates to large shippers. But the injured carrier is more likely to resort to retaliation in kind than to assist in prosecution, and the Commission has found it impossible to obtain the assistance of one carrier in bringing another to justice. This is not only because of the effect as between the railroads themselves, but because a railroad which attempted to stop the giving of low rates by another one would incur the ill will of some portion of the business community and thus affect its own patronage. The risk is one which in the experience of the Commission the carriers are slow to encounter. One general manager says that if any railroad company should go into court with charges that shippers are receiving favors from other railroad companies, it would result in a boycott of the company making the charges.

EMBARRASSMENT OF COMMISSION BY COURTS.

The report refers to the decision of the Commission as to the legality of one way party rates for passengers, and to the fact that a United States Court in Ohio, which, on appeal, rendered a decision on the subject contrary to that of the Commission, did not accept the Commission's findings of fact, but went over all the testimony anew as if it were an original case. Action of this kind, and the results flowing from it, will greatly embarrass the work of the Commission, and will cause uncertainty and delay in the administrative work of the Commission. If carriers can freely appeal to the courts the delay alone defeats the intended remedy, and effective regulation of railroads by the Commission will be impossible. The report then goes into a long discussion of the functions of the Commission as related to the courts, and draws numerous distinctions between questions which are legal and judicial and those which are "administrative." The principal illustration is drawn from the question of reasonable rates, which, being interwoven with the question of classification and based on the conflicting elements of "what the traffic will bear," cost of service, and other elements which can never be made subject to rule, is claimed to be a question of such a nature as to be wholly unsusceptible of treatment by a court. The courts, if they undertook this, would have no time for anything else. Various rate questions have come before the courts, but have always been decided on the assumption that all other rates were to remain unchanged; but this rule would fail if the principle were to be extensively applied. The only definite recommendation of the Commission in this line is that the 16th section of the law be amended so as to make findings of fact by the Commission conclusive, under reasonable limitations, the principal of which is a limit of time (20 days) in which the findings may be challenged.

The Florida Railroad Commission has reported a case where a road manipulates intrastate rates so as to evade the interstate law. The case is not very clearly explained, but apparently this is done with the connivance of a road in an adjoining state. The Commission asks that the law be so strengthened that all roads must unequivocally submit all their business to either the national or the state law.

POOLS AND RATE WARS.

Of rate wars and rate cutting the Commission says, if the regulations for making and publishing rates and for adherence to them were all carefully obeyed, rate wars would seldom or never occur, and when they did the law would prevent most of the abuses which now attend them. Agreements between the railroad companies have never been found effectual. Having no legal sanction, they continue only so long as those forming them could see it was for their interest to abide by them. Pools being under the ban of the law there is no means left to the associations of enforcing agreements. At the last session of Congress the carriers caused a bill to be introduced in each house authorizing agreements to apportion competitive traffic, but no action was taken on the bill and it is still pending.

THE FOOD PRODUCTS CASE.

The Northwestern food products case is considered at some length in the report. The Commission believes that the effect of the order nominally reducing rates was really to equalize them rather than to reduce them. Before the order was issued the Commission asked for specific information from the carriers as to corn brought from points west of the Missouri River to Chicago, the proportionate division of the rate received, the rate actually collected, and as to the consignees. This information was refused. The failure to furnish this information was not calcuated to lead the Commission to the conviction that the complaints of injustice in its action were well founded. The Commission considers that the very disclosure of the conditions of this business would have been a check upon reckless competition, and would have given to the roads some of the benefits which they would expect to get from the privilege of pooling.

The Commission caused inquiry to be made by the Attorney-General of the United States into violations of the law as to rebates and unjust discrimination, and complaints for criminal prosecution have been placed by it in the hands of United States district attorneys at Chicago, Cincinnati, Cleveland, Dubuque, Memphis, New York and Pittsburgh.

UNIFORM CLASSIFICATION.

Some space is given to a discussion of what constitute reasonable rates, and then the subject of uniform classification is taken up. This was one of the first matters to receive the attention of the Commission, which has insisted that one uniform classification should be made. The Commission has not, however, overlooked the great difficulties attending such a work, which would affect not only the railroads but every section of the country, which would of necessity be compelled to resign something of the advantages which it had enjoyed in respect to its special products or industries. Many of the ablest and fairest-minded railroad managers consider it a maxim that uniform classification can only be reached slowly and by successive steps. Nevertheless, in December, 1888, delegates from eight of the most important associations convened at Chicago and appointed a standing committee to unify as rapidly as possible the several classifications now in use. The classification was submitted by the committee with a recommendation that it should go into effect Jan. 1, 1891. It is believed that it will be adopted, though possibly not by the time named. Unfortunately the Transcontinental Association failed to unite in the report, so that the Pacific Coast business will for the present be left to the old confusion. The Commission affirms its confidence that the time is not far off when one freight classification will cover the United States. The Illinois Commission has adopted the classification of the Associations' committee to take effect March 1, 1891, and the committee will at an early day confer with the railroad commissions of other states.

LONG AND SHORT HAUL.

Complaints with regard to the operation of the long and short haul clause have been less frequent than during the preceding years, and it is believed that rates have been made so fairly proportionate that the clause no longer works injustice to the carriers, if it ever did. It is pointed out for the information of those who look upon this clause as an unwarranted invasion of the rights of carriers that such a law is not new. Previous to the passage of the act 17 states had similar provisions and now fully one-half of the states, by enactments covering a period of 40 years, have declared the principle of the long and short haul clause to be sound, just and politic. The Commission reaffirms its conviction that some enactments recognizing this principle will always remain in force.

THE SCALPERS.

The Commission reserves its most serious and indignant language for the scalpers. In its last annual report specific legislation by Congress was recommended to restrain this illegitimate and reprehensible business, now regarded as one of the worst evils connected with transportation. A bill was introduced in both houses of Congress early in the last session embodying the essential features recommended by the commission. It failed to pass and, in fact, is believed *not to have been reported by the committees of either House.* It is understood that strenuous opposition was made to the bill by the ticket scalpers of the country, and it is believed that railroad managers generally are in favor of efficient legislation for the overthrow of this evil and that a strong public sentiment exists against its toleration. The Commission has made some investigation of the magnitude of the business carried on by scalpers. It finds in New York thirteen scalping offices with an estimated annual expense for rent and clerk hire of from $20,000 to $25,000, and an es-

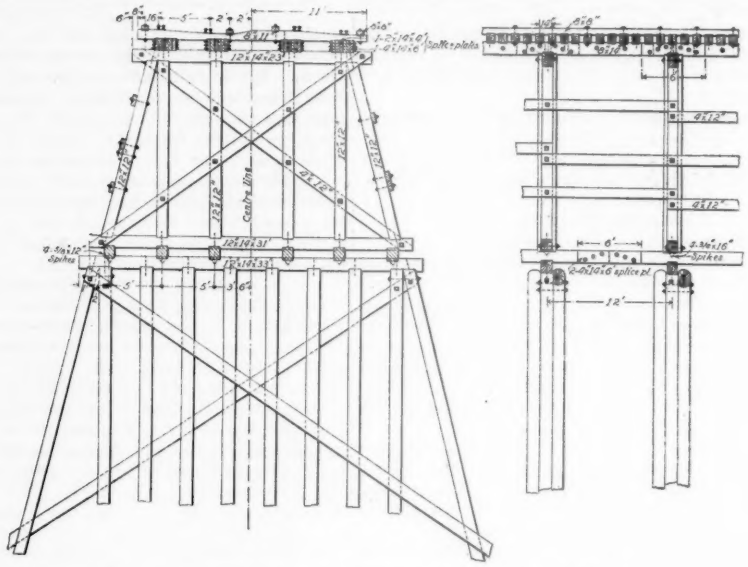


Fig. 1—Sectional and Side Elevations, Winthrop's Cove Trestle.

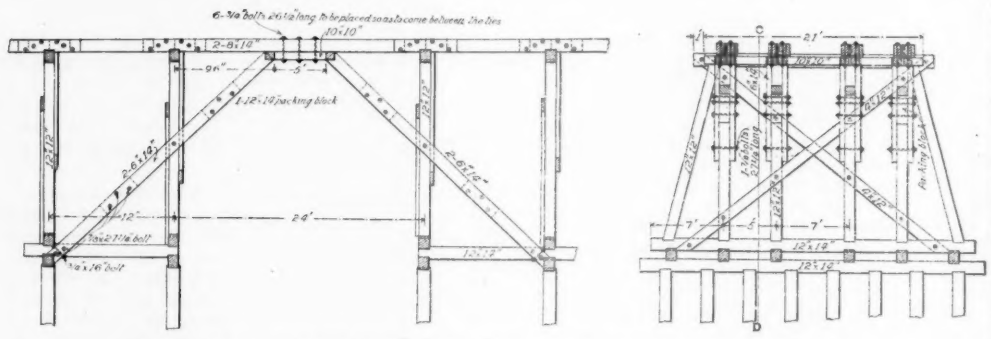


Fig. 2—Longitudinal and Transverse Sections of 24 ft. Bay, Winthrop's Cove Trestle.

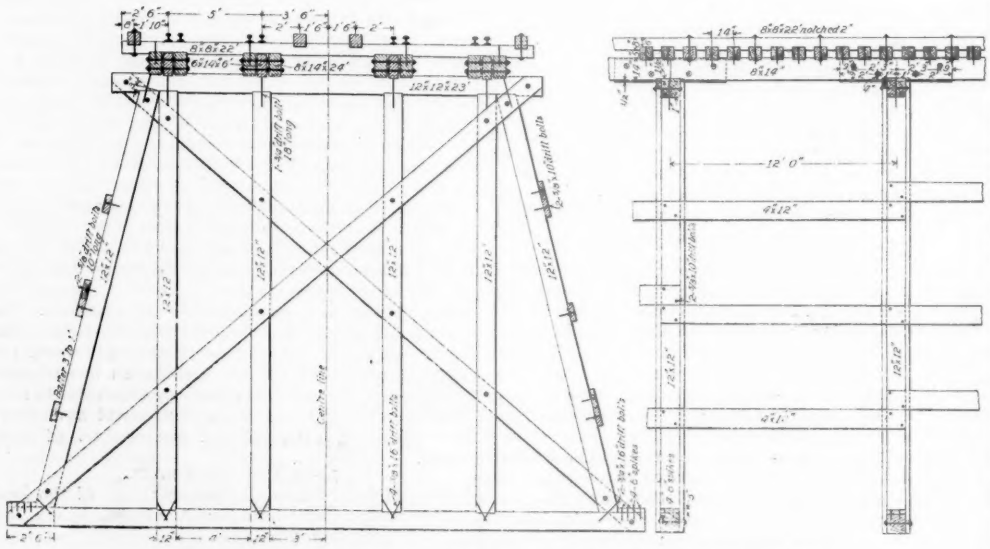


Fig. 3—Sectional and Side Elevations, Thames River Bridge Approach Trestle.

TRESTLE PLANS—NEW YORK, PROVIDENCE & BOSTON RAILROAD.

timated annual profit of from $90,000 to $100,000. Chicago is still more prolific in this kind of vermin, and it is believed that the profits from this illegitimate business exceed a million dollars a year. The expenses of the business and the profits necessarily come in the first instance from the carriers, then, indirectly, they are borne by the public, so that the business burts both ways. The harm done by an army of unscrupulous depredators upon a legitimate business cannot be computed by any known standard. Moreover, its effects are not only financial, but it is demoralizing to public morals and business honor. But, worse than this, the business of scalping facilitates and promotes dealing in tickets and passes that have been stolen, uncanceled tickets, forged, altered and spurious tickets. One might suppose that a practice of this character could no more be defended than larceny or forgery, but, strange as it may appear, it is defended before legislative bodies and elsewhere.

COMMISSIONS.

The payment of commissions to influence passenger traffic is closely allied to the business of the scalpers, and said by the Commission to be one of the most disturbing, wasteful and useless evils of the day. In the last session of Congress a bill was introduced to prohibit the payment of commissions, but it has not yet been acted upon. The voluntary action of railroads and railroad associations for several years has been toward doing away with this custom, but such action must be largely futile until there is a law to make the practice criminal.

AMENDMENTS.

The Commission recommends the following amendments:

Requiring the receiving, forwarding and delivery by every common carrier, at the request of any other common carrier, of through traffic at through rates or fares.

An amendment to the tenth section to remove any ambiguities in the language and make the criminal remedies applicable to a corporation as well as to its officers and agents.

An amendment to the twelfth section making clear the obligation of witnesses to attend before the Commission, regardless of the boundaries of judicial districts; also providing for taking testimony by deposition; also that the Commission may make examinations by agents.

A provision for the free carriage of persons injured in railroad accidents and of physicians and nurses attending upon them.

Providing that the payment of commissions by one railroad company to the ticket agents of another be absolutely prohibited, and that a similar prohibition extend to commissions for soliciting or procuring freight or passenger traffic by outside organizations or persons.

An amendment to abolish ticket brokerage by requiring that every person who sells passenger tickets shall be duly authorized by the company for which he sells, and that the company shall be held responsible for his acts.

Providing that the payment of car mileage for private cars be regulated.

An amendment giving authority to the Commission to call for reports from carriers at such times and covering such periods as may be deemed desirable. Also that the Commission be authorized to call for reports from companies having connecting or terminal facilities, rolling stock or floating equipment used by carriers.

Finally, an amendment to the sixteenth section embodying a provision to make findings of facts by the Commission conclusive under such limitations as will properly guard the rights of carriers.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

TRESTLE PLANS, NEW YORK, PROVIDENCE & BOSTON RAILROAD.

The accompanying cuts show the plans of a double track trestle built across Winthrop's Cove on the line of the New York, Providence & Boston Railroad. It is on a curve of 8 deg. 15 min. and a grade of 0.714. It was designed by the Resident Engineer, Mr. J. Albert Monroe.

Fig. 1 shows a section and side elevation of the trestle, and fig. 2 a section and elevation of a knee-braced bay of double the ordinary span.

It will be noticed that the ties extend entirely across the structure, being 8 in. × 11 in. × 22 ft. The rail is elevated by cutting the ties in a double wedge shaped fashion.

The guard rails are notched 1 in. over the ties and are bolted through every third tie by ⅞-in. bolts. The stringers are each composed of two pieces of 8 in. × 14 in. timbers. Their joints are especially strong, though requiring considerably more iron than is generally used. On the outside of each broken stringer piece a splice block 4 in. × 14 in. × 6 ft. material is placed. The stringers are notched 1 in. over the caps, and the caps are notched 1 in. to receive the stringers. The stringers are also drift bolted to the caps and the caps drift bolted to the posts. All of the posts are notched 2 in. into both the caps and the sill.

The sway bracing is of 4 in. × 12 in. plank, and is well fastened to the posts. There is also an ample supply of longitudinal bracing.

The trestle rests upon a foundation of eight vertical and two inclined piles to each bent. The piles are capped by a 12 in. × 14 in. × 33 ft. timber, into which they are notched 2 in. Purlins, having a section of 12 in. × 14 in., and spaced 5 ft. centre to centre, separate the sill of the framed bent from the cap of the foundation bent. The piles are tied together by sway braces made of piles.

BILL OF TIMBER—ONE BENT AND ONE BAY.

Name.	No. pieces.	Size.
Floor System.		
Guard rails	2	8 in. × 8 in.
Ties	11	8 in. × 11 in. × 22 ft.
Stringers	8	8 in. × 14 in. × 24 ft. (two bays).
Splice blocks	4	2 in. × 14 in. × 4 ft.
	4	4 in. × 14 in. × 6 ft.
Framed Bent.		
Cap	1	12 in. × 14 in. × 23 ft.
Vertical posts	4	12 in. × 12 in. × — ft.
Batter posts	2	12 in. × 12 in. × — ft.
Sill	1	12 in. × 14 in. × 31 ft.
Sway braces	2	4 in. × 12 in. × — ft.
Pile Bent (Foundation).		
Cap	1	12 in. × 14 in. × 33 ft.
Vertical piles	8	14 in. diameter.
Batter piles	2	14 in. "
Sway brace piles	2	
Miscellaneous.		
Longitudinal braces	5	4 in. × 12 in. × 25 ft. (two bays).
Purlins	6	12 in. × 14 in. × 24 ft. (two bays).
Splice blocks for purlins.	12	2 in. × 14 in. × 6 ft. (two bays).

BILL OF IRON—ONE BENT AND ONE BAY.

Name.	Size.	No. of pieces.	Use.
Bolts	¾ in. × 15½ in.	8	Guard rail to ties.
Bolts	¾ in. × 19½ in.	8	
Bolts	¾ in. × 18¼ in.	12	Sway braces to posts, etc.
Bolts	¾ in. × 22 in.	18	Purlin splice.
Bolts	1 in. × 18 in.	10	Longitudinal braces to posts.
Bolts (packing).	1 in. × 22½ in.	8	Through stringers over centre of bays.
Bolts (packing).	1 in. × 26½ in.	24	Through stringers at joints.
Bolts	1½ in. × 34 in.	6	Batter piles to vertical piles. Sway brace piles to vertical and batter piles.
Drift bolts	¾ in. sq. × 21 in.	8	Stringers to caps.
Drift bolts	1 in. × 18 in.	6	Sills to posts.
Drift bolts	1 in. × 20 in.	16	Cap to posts. Pile cap to piles.
Spikes		..	Ties to stringers.
Spikes	⅝ in. × 12 in.	24	Purlins to pile cap.
Spikes	¾ in. × 16 in.	24	Sill to purlins.
Washers (wr't)	¾ in. bolts	16	Guard rail bolts.
Washers (wr't)	4 in. × 4 in. × ⅜ in.	24	Sway brace bolts.
Washers (wr't)	4 in. × 4 in. × ½ in.	20	Longitudinal brace bolts.
Washers (wr't)	4 in. × 4 in. × ⅝ in.	12	Sway brace, pile, etc., bolts.
Washers (wr't)	3 in. × ⅜ in.	36	Purlin splice bolts.
Washers (wr't)	3½ in. × ½ in.	64	All stringer bolts.
Separators (cast)	3½ in. × 1 in.	32	Between splice blocks and stringers.
Separators (cast)	3½ in. × 4 in.	16	Between stringers where there are no splice blocks.

*Copyright, 1890, by W. C. Foster, and condensed from his forthcoming book on the same subject.

BILL OF TIMBER—24-FT. SPAN BAY.

Name.	No. of pieces.	Size.
Floor System.		
Guard rails	2	8 in. × 8 in.
Ties	22	8 in. × 11 in. × 22 ft.
Stringers	8	8 in. × 14 in. × 24 ft.
Splice blocks	4	2 in. × 14 in. × 4 ft.
	4	4 in. × 14 in. × 6 ft.
Rents, same as 12-ft. span bay previously given.		
Miscellaneous.		
Straining beam	8	10 in. × 10 in. × 5 ft.
Cross timbers	2	10 in. × 10 in. × 21 ft.
Knee braces	16	6 in. × 14 in. × — ft.
Packing blocks	16	12 in. × 14 in. × 4 ft.

BILL OF IRON—24-ft. SPAN BAY.

Name.	Size.	No. pieces.	Use.
Bolts	¾ in. × 26½ in.	24	Straining beam to stringers.
Bolts	¾ in. × 16 in.	16	Foot of knee brace to prevent knee brace splitting.
Bolts	⅞ in. × 27¼ in.	72	Knee braces to purlins, to packing blocks, to posts.
Washers (wrought)			For above bolts.

In addition to the above there will be required all of the iron given in previous list, except that used for fastening on the longitudinal braces and splicing the purlins.

Fig. 3 shows the general plans of the trestle approach to the Thames River bridge. In general design it is very similar to the above described trestle, only varying in a few of its delails. The trestle being on a tangent, the ties are, of course, of even section. The stringer joint is somewhat different, and brace blocks are used to retain the foot of batter posts in place rather than the notching of the sill.

Mr. Walker to the Presidents.

We give below some extracts from an important letter addressed by Mr. Aldace F. Walker to the presidents of the roads in the Interstate Commerce Railway Association. The letter bears the date of Nov. 20, and apparently got into print without Mr. Walker's knowledge or intention. The views which it presents are not new to him or to our readers, but they are given with a certain definiteness and directness which makes the letter uncommonly interesting reading.

. . . Competition as it now exists among carriers is simply war and the situation pleases the unreflecting public . . . In fighting each other the various lines are rapidly destroying themselves. There is no occasion for aggressive action by those who represent an agrarian policy. All they need to do is to watch the progress of the strife among the roads and drop in an occasional peg as the cards are played. The corner has already been turned and the pegs are coming toward home. During the past fifteen years about one-third of the railway mileage in the United States has been reorganized or passed through foreclosure proceedings. One line after another steps one side and a portion of its capitalization disappears. Is this suicidal process beyond control? I do not believe it. But radical changes are required for the purpose.

The roads have provided a place of meeting and rules of procedure where they methodically pit their representatives one against another for the purpose of what is called establishing competitive tariffs. Probably 90 per cent. of the tariff changes effected through the existing association rules are reductions.

Another phase of the game is not played openly upon the association tables. The alleged existence of secret deals is often made the occasion for new tariff standards.

Mr. Walker speaks of the cutting of passenger rates through the offices of ticket brokers, and continues: There is an abundant opportunity for manipulation and discrimination, and the constant tariff shrinkage on the basis of foreign commissions is recognized and protected by the association agreement. In freight traffic complaints of discrimination by means of special long-term contract or otherwise, of the use of commissions, free transportation and other inducements to influence business, of manipulations and divisions are frequently heard, and the shippers have learned to cunningly obtain concessions which they know to be illegal. This is competition gone mad. It is clear that such wild and reckless business methods are not in the interest of the public. It is equally clear that they are ruinous to the railway system. . . . The conclusion of the whole matter is that railway managers should recognize the essential unity of railroad interests, and act accordingly.

It is an insult to the presidents to say that these things are beyond their control. The gentlemen to whom this paper is addressed have the power by concurrent action to put an end to every unfair species of unfair competition throughout the entire territory between Chicago and the Rocky Mountains. And if this were done, is there any one of them who will say that his line is so situated that the natural flow of traffic upon fair and sustained rates would give it less net revenue than it would realize under a fighting policy? If any one can do so, let him prove his case and state his price. . . .

A new treaty is now required, which should be based upon disarmament. The lines should rid themselves of the machinery for rate cutting, either open or secret. Both are alike destructive. I venture, therefore, to suggest, somewhat more in detail than I have heretofore attempted, the form of what seems to me the best agreement attainable at the present time. If not acceptable in all particulars, perhaps parts of it may be found useful.

The fundamental principles of railway association should be concentration of authority and unification of interest. These results may, perhaps, be reached in respect to freight traffic by an agreement providing for a rate division and a traffic division. The rate division needs no meetings of rate committees; but its executive board should have power, both original and final, in the establishment and publication of all tariffs, local and competitive, individual and joint. This concentration would largely reduce expenses in printing, and secure uniformity in the form of rate sheets. It should be comprised of a small, but expert, intelligent board in constant session. Applications for changes in tariffs, classifications and rules and regulations governing the transportation of freight should be presented in writing and acted upon with or without a special hearing, as thought advisable. The board should also have an initiative of its own, to be used in cases of commercial necessity and of outside competition. It should act upon broad considerations of right, preventing so far as possible unjust discrimination in rates between localities, persons, and different descriptions of traffic, and seeking to promote the free and equal movement of business in every direction; it should make stability of rates a prominent factor in its methods, and should be expected to secure revenues just and reasonable to the roads as well as to the public. . . .

The executive board should owe no allegiance to any interest, but should be in the joint employment of all the lines, as the agents of each, responsible directly to the several boards of directors through the presidents.

The traffic division should control the actual handling of the business. A single efficient commissioner is enough; but he should be subject to the supervision of a board of managers, composed of the highest traffic officials of each line. The traffic division should have the exclusive right to contract with connecting roads in respect to the exchange of business and the divisions of joint rates, and with shippers at all points outside the association territory; joint agencies should replace the innumerable separate agencies now in vogue; this might be extended ultimately to competitive points upon the lines of members.

The work of the traffic division, also, might very properly embrace the Clearing House idea, under which it would receive copies of all billing, adjust accounts between companies upon through business, settle all loss and damage claims, and audit all car service payments. In other words, it should take immediate actual control of all joint business, and perhaps in the end of all competitive business local to the several roads. . . .

Under such a concentration of methods it seems to me that the danger of destructive rate-cutting, either secret or open, would be substantially eliminated, the net revenues of every line would be protected, and at the same time the public would be better served.

The Indicted Railroad Officers at Chicago.

Arguments were made before Judge Gresham at Chicago this week in support of the petition for a writ of habeas corpus in the case of J. C. Peasley, First Vice-President and Treasurer of the Chicago, Burlington & Quincy, committed for contempt before Judge Blodgett for refusing to answer questions put to him by the Grand Jury, as noted in these columns last week. The District Attorney claimed that as Mr. Peasley had testified that he had no personal knowledge of the payments alleged to have been made to one Gallup by some agent or official of the Burlington road, and that he had given a general order to his subordinates to pay all vouchers properly approved, that he would not incriminate himself by testifying; also, that for the same reason he would not criminate himself by producing the books and papers of the company; that the production of the books and papers would not incriminate the company (as be set up) as it had been decided that a corporation could not be indicted under the Interstate Commerce Act. Counsel for the defense claimed, in addition to the same grounds taken in the Counselman case, that the prosecution was attempting a piece of sharp practice in setting forth in the petition that the suit in which he was attempting to compel Peasley to testify was not against him, but against Miller, the General Freight Agent; consequently Peasley's testimony would not incriminate himself. The investigation was directed against all the agents and officers of the Burlington road. Even if Peasley's testimony would not criminate himself, the production of papers and books (which was the principal thing aimed at) would disclose matters which might indirectly criminate him. The Grand Jury had already indicted Miller. Proceedings against Peasley might now be instituted, and the books and papers secured from him in the prosecution of the suit against Miller could be used, with Miller as a witness, to convict Peasley.

The court stated that inasmuch as this and the Counselman case were likely to run into each other in many points, he would consider them together and announce his opinion on both at the same time. Continuing, he said: "This much is plain, I think, in view of the fifth amendment. No man can be obliged either by a grand jury or a court to accuse himself. Now I think if the fifth amendment had never been adopted, the courts in this country, and in England also, under the common law would not tolerate the practice of obliging a man to come into court and submit to punishment upon evidence extracted from himself. In questions involving the liberty of persons the courts are not expected to consider the constitution in a narrow way. They must look at the substance of the thing."

Three Collisions Under the Block System.

The London *Railway News* of Nov. 29 gives some particulars of the collision discussed in our editorial column last week, which were not mentioned in the earlier accounts. Besides the accident near Taunton (here referred to as Norton) there were two others within two days. The *News* says:

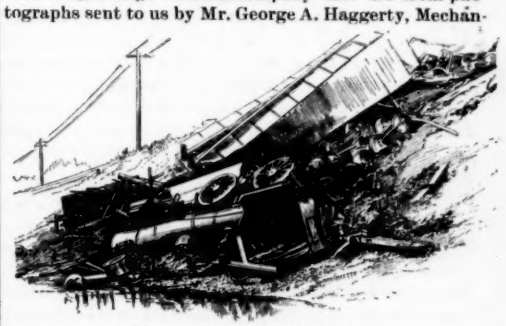
The occurrence of three railway accidents, so closely together in point of time, and arising from a somewhat similar cause, has naturally created widespread interest. The first of the three accidents occurred on the Great Western on the night of Nov. 11. [Reported in the *Railroad Gazette* Dec. 5.] The second took place Nov. 11, at Gorgie Station, on the inner circle of the North British Edinburgh Suburban Railway. In this case a goods train standing at the north end of Gorgie Station was forgotten by the signalman, and a passenger train which was improperly admitted into the section ran into the rear of it. There was fortunately no loss of life, but many persons were injured. The third accident occurred near Chalk Farm, on the North Western, on the 13th. An up goods train was standing near the exit from the tunnel, situated between Loudoun road and Chalk Farm. The signalman at the mouth of the tunnel overlooked it, and gave permission to Loudoun Road to send forward a workman's train, which ran into the goods, and caused the instant death of the guard in the rear brake van.

The point of resemblance between the three accidents is that, in each case, a goods train standing on a main line was forgotten, and a following passenger train was permitted to enter the block section and to come into collision with it. The point of dissimilarity is that in the accident at Norton the goods train which caused the evil was admitted into the section by what may be termed a lateral movement, from one main line to the other, while in the two other instances the trains were following on the same line. All three exhibit forgetfulness and a disregard of instructions. The Norton accident is the most painfully instructive, not only as being more disastrous, but as representing a class of accident difficult to guard against. The crossing of trains from one main line to another is specially provided for by stringent rules in a book of regulations issued so recently as the close of 1889. . . . The train is required to stand within the home signal, so as to be protected, and to be within view of the signalman, and, as a special precaution by night or in foggy weather, the engine must show a red head light in the direction in which a train would approach; the driver is required to whistle at frequent intervals to keep the signalman alive to the presence of the train, and the guard of a train or fireman of a light engine is required to go to the signal box and remain there until his train or engine is authorized to shunt back to its proper road. The existence of these conditions proves that all reasonable precautions are provided in the rules, to insure safety, and if they had been carried out to the letter no accident would have occurred at Norton. But they were only imperfectly fulfilled. The driver placed the engine lights at danger, he reversed them when the fast train had passed him [He should have waited until he regained his own track], and there was not time to place them again at danger before the collision. The whistle was sounded once only, and the signalman says he did not hear it. The guard remained in his brake van, and did not go to the signal box. The signalman was entirely oblivious of the position of the goods train, and a terrible collision was the consequence. As usual in most accidents, failure is due not to one circumstance only, but to a combination of circumstances, and a series of neglects. It is the one element of human fallibility that nullifies a whole code of regulations. The moral to be drawn is to shunt trains from one line to another as little as possible. The rules, however, prescribe that such occupation of the main line must be avoided as far as practicable. There is a further reflection, of a general nature, suggested by these accidents—viz., that the safety of railway working depends upon the maintenance of the strictest discipline. The influence upon the staff must be moral rather than material. It must be felt at all times and at all places, even when the eye of authority is far removed. It is this necessity for the constant control of a staff, of necessity widely scattered, that constitutes one of the great difficulties of railway management. Any relaxation leads to disaster, as certainly as a demoralized army invites defeat. The moral obligation of implicit obedience was wanting in the guard, driver and signalman at Norton, and led to the lamentable catastrophe.

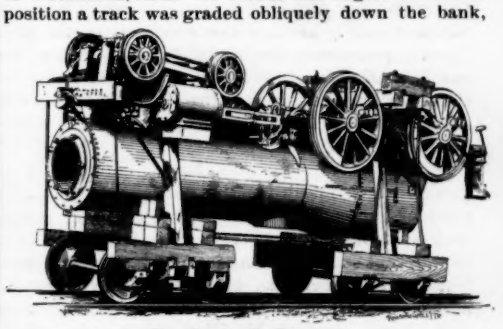
The collision at Chalk Farm was in consequence of the forgetfulness of a signalman who had such heavy work, for four hours every morning, that he was excused from entering the time of trains on his register during those hours. He had no boy to help him. The Gorgie collision is said to have been a case where a signal pulled off for a light engine was seen by the engineer of a following train and taken by him as intended for himself.

An Incident in the Life of a Locomotive.

The engravings which accompany this are from photographs sent to us by Mr. George A. Haggerty, Mechanical Superintendent, New Brunswick Railway Company, and represent some of the vicissitudes of a locomotive which are not altogether peculiar to that road. In this case the engine ran over a cow and was thrown down a 60-ft. bank, landing nearly bottom up at the edge of deep water in the river St. John, within the city limits of Woodstock, N. B. To rescue the engine from this position a track was graded obliquely down the bank,



He went into a Far Country.



The Prodigal's Return.

and the locomotive was then turned bottom up on trucks, as shown. The trucks carrying it were hauled up the track by cables, and the engine was then hauled to McAdam Junction, a distance of 60 miles, at a speed of 15 miles an hours.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

In another column we give an extract from a letter received from Mr. C. E. Smart, General Master Mechanic of the Michigan Central Railroad, regarding their new high speed compound engine built by the Schenectady Locomotive Works. We may expect something new and satisfactory in this engine, as the Schenectady Works have been devoting much attention to this subject, and the engine is the result of all investigations to date. We are pleased to note that the boiler has radial stays instead of crown bars, that it has the extended wagon top and increased heating surface and steam room. This is a move in the right direction, and for a high speed compound we believe that this locomotive promises to be the best yet produced. All will await with interest the results of the practical trials.

On Monday there was published in the *Journal of Finance*, of New York, a letter from Mr. Aldace Walker, dated Nov. 20. The story is that the letter was written to the presidents of the roads in the Inter-State Association, and that the *Journal* got it from a Western railroad officer now in New York. Extracts from it appear in another column. It is a very spirited statement of the traffic situation and reveals several things. Among other incidental revelations is that of Mr. Walker's familiarity with cribbage, and there is not wanting a suggestion that he knows some less innocent games. But, as Rudyard Kipling says, "that is another story." The point of the letter is that the railroad officers are doing a good deal more harm to the properties under their control than the state legislatures are doing or are likely to do, and that the presidents themselves can stop the waste and ruin if they want to. Mr. Walker suggests a central board to fix all rates, and a commissioner to divide traffic. Undoubtedly this is possible if all the roads can be whipped in and kept in—the Alton, for instance, and the Gould roads, with which must now be counted the Union Pacific. But if these roads come in, how long will they stay? There is the weakness of the plan. Can any punishment for backsliding be contrived that will hold all the roads to a new agreement any better than they have been held to the old one? Or have the railroad officers lately acquired, through sad experience and much sharp discussion, such wisdom, forbearance and firmness that, having entered into an agreement obviously for the public good and for the good of railroad stockholders, they will in general stick to it even if one or two roads break it? To be sure, recent concentration of interest makes it easier to form an agreement, as there are fewer parties to agree. So it makes it possible for a few men to do more harm. Perhaps Mr. Walker has some plan for making the new agreement more stable than the old ones which he will present in good time, say at the Presidents' meeting next Monday. If he has, we hope sincerely that it will be adopted and will be found effective and durable. But until it is revealed we cannot help thinking that a new association, putting the rate-making power out of the hands of the officers of the individual roads, and making what is really a traffic pool, will but repeat the lessons of the present ones. We are sorry to receive the project with so little faith, and no one can wish for its success more than we do.

The term of Interstate Commerce Commissioner Augustus Schoonmaker expires Jan. 1 next, so the appointment of his successor may be expected during the present month. Strong efforts are being made by leading New York City business men to induce the President to renominate Judge Schoonmaker. He is a Democrat in politics, while the administration is Republican, and yet it was clearly the intention of Congress that the Commission should be non-partisan. The law prescribes that no more than three of the five Commissioners shall be of any one political party. This, of course, allows of the appointment of a Republican in Commissioner Schoonmaker's place, but, on the other hand, the term of another Commissioner, also a Democrat, expires a year hence, and in the one case or the other a Democrat must be given the seat. So, politically, there is nothing to be gained at this time by the substitution of a member of one party for the other. This being the case, greater weight can be given to business considerations than is usual in appointments by the party in power, and upon this point the claims of Judge Schoonmaker are conceded to be very strong. The business men of New York, as already remarked, are petitioning the President for his renomination. It is also said that the leading railroad men, not collectively but individually, will take quiet means of letting the President and Congress know that they have faith in the knowledge and fairness of the present incumbent. Commissioner Schoonmaker has shown himself to be conservative when conservatism was needed, and broadminded enough to look upon all sides of our complicated transportation questions. There is nothing of the demagogue about him. The decisions written by him have been models of fair reasoning and have shown a grasp of affairs and an insight into railroad principles which have not been excelled in any of the reports of the Commission. If we are to have regulation of railroads by authority of the Federal Government it is pre-eminently important that the delicate questions which must inevitably arise shall be placed in the hands of the ablest men. Suppose for a moment that the present Commissioners by degrees should be exchanged for political hacks; what mischief could they not do to railroad and trade interests? A commissioner like Judge Schoonmaker, who has had the experience of the last three years and who has added to his original knowledge by the experience, should be continued in his non-partisan position. Certainly railroad officers must await any other appointment with some anxiety.

Shortly after dark on Thanksgiving day a rear collision happened on a railroad running into New York which by good luck resulted in no deaths. The second section of an excursion train ran into the first section, which had been stopped by a signal. Of course the newspapers said that the air brakes failed to act, and probably the general public accepted this explanation without question. The reporter's customary explanation of a collision is that the air brakes failed, and of a derailment that the rails spread, although either of these causes is about the last one that an experienced railroad man would look for. An investigation of the accident in question showed that the engine runner evidently did not see the lantern of a flagman who went back, or the tail lights of the section ahead, until he was actually into it; although the night was clear and the view open for an ample distance. He was discharged. There are two other circumstances connected with this accident that indicate that some one else ought to be discharged. The line in question is supposed to be worked under a block system, the train order signals at the telegraph stations being used as block signals. This accident took place between two such stations, just a mile apart, and how both sections happened to be in the block at once we have not learned. The other circumstance has to do with the brakes. This excursion train was made up at a station 20 miles from the terminal. In turning the locomotive of the second section the train pipe angle cock at the rear of the tender was knocked off and the train of six cars, full of passengers, was started to run the 20 miles without the air, so that the brakes probably would have "failed to work" in the emergency, if the engineer had called for them. The coupling at the front of the engine was intact, and had it been run backwards the air could have been used. Whether or not this would have been better railroading, all the circumstances considered, than running without the air we cannot say, not knowing all the conditions; but certainly good railroading required that the crippled section should be kept a block behind the first section. Altogether, it was a queer combination of faults and accidents, and the railroad is in great luck not to have to settle for a long list of deaths and injuries.

The Interstate Commerce Report.

The fourth annual report of the Interstate Commerce Commission is less satisfactory than its predecessors. This is not surprising. The illness of Judge Cooley, the absence of Mr. Walker in another field of labor, and above all the strain of constant effort to deal with more work than can possibly be accomplished, are sufficient to account for the difference.

The Commission frankly admits that rates are not well maintained. It discusses several of the minor causes intelligently, but leaves the two most important elements wholly out of account. It says nothing either about the question of pools or the effects of over-legislation. To handle the question without reference to these two things is to play Hamlet with the part of Hamlet left out, and Ophelia too.

When the Interstate Commerce law was passed every intelligent man knew that the pooling clause must prove a great obstacle to its success. It is true that pools had not worked particularly well; but nothing else had worked at all. In those countries where the evils of discrimination had been best controlled pools were recognized as a necessary means to that end. Congress attempted to secure the end and prohibit the means. The result was exactly what might have been expected. For obvious reasons the Commission does not care to discuss this question exhaustively. It would be bad taste and bad policy for it to criticise a law which it was appointed to administer. But it ought not to ignore facts; still less ought it to pretend to cover the question by casting slurs on pools as they previously existed. To say, as may be said with truth, that pools were often bad in the past does not meet the issue. The point is, that anything else has always been worse.

For failing to see how over-legislation has interfered with rate maintenance the Commission is still more to blame, since it has itself some share of the responsibility in this matter. It has constantly striven to extend its jurisdiction. Starting as an administrative body, it rapidly acquired the functions of a court, and took more and more questions into review. Not content with judging of equality of rates, it considers their reasonableness, and exacts from the railroads, not merely that they should conform to the letter of the law, but to a somewhat high standard of ideal requirements.

This often works badly. Take the matter of classification. It sounds well to have a uniform classification throughout the whole country. It is a serious inconvenience to shippers to have to deal with varying classifications in different sections. On the other hand, each section has become accustomed to its own methods. If we force the roads of any one section to conform to a standard set by the others, it will so interfere with business usages as to create serious and well grounded opposition. There will be a strong local demand, not merely for commodity rates, but for special rates; a demand in many instances so well founded that the roads feel fairly safe in yielding to it. We are inclined to think that this has been the chief result of the pressure toward increasing uniformity. The nominal differences have become less, but the real variations from the apparent standard are greater than ever.

It need hardly be said that this is a thoroughly bad result. The first thing is to have the actual rates conform to the published tariffs. To have the published tariffs arranged on a good system, though an important object, is a secondary one, and if it is attained by the sacrifice of the first it is worse than useless to the country. If the Interstate Commerce law had contented itself with prohibiting personal discriminations and giving jurisdiction to the Commission and the United States courts in cases of such discrimination, we believe that it would have accomplished vastly more than has actually been done under the present effort to attain a great many contradictory ends.

Under these circumstances it is doubtful whether the request of the Commission for more power ought to be seconded. Its findings of fact are now prima facie evidence; it desires that they should be made conclusive evidence. We should question the wisdom of this change. A new judicial body is far more apt to suffer from too great statutory power than from too little. The English commission of 1873 is an example of such failure. It had almost exactly the power which the Interstate Commission now asks. That power proved its destruction. It attempted too much.

It thought that it had a real power corresponding to its statutory power. It pretended to do a great deal, and actually did next to nothing.

A new judicial body must depend for its authority on the moderation and reasonableness of its decisions. That was what the Massachusetts commission did; it was what the Interstate Commission at first did. People acquiesced in the opinions because they felt that there was moral and intellectual force behind them. The question of having findings of fact made conclusive would not have occurred to any one in connection with the Louisville & Nashville petition, or the case of Providence Coal Co. *vs.* Providence & Worcester. But as the Commission gradually widened the field of its jurisdiction and tried to decide what rates were reasonable, it touched on more doubtful matters, and no longer had the unquestioned moral force behind it. If the Commission is wise, it will draw the lesson that it should not take up such questions any more than it can help. If it supposes for a moment that statutory power can take the place of moral force, or that an old and established court will refuse to review questions of fact because Congress tells it not to, it is greatly mistaken. Now, and for years to come, the Commission must depend upon itself and not upon Congress.

The discussion in the current report with regard to reasonable rates is hardly of a character which would make it desirable to see the Commisson assume too much power under this head. Many of the old-fashioned fallacies with regard to railroad economy have found their way into the reasoning. We shall reserve this part of the subject for discussion in a subsequent issue.

Revising Train Rules.

In speaking Nov. 28 about the issuance of circulars explaining train rules, we referred to the fact that the importance of circulars of this kind is not generally recognized, and spoke of the necessity of placing them on an equal footing with the rule book itself. An officer of the Savannah, Florida & Western, the road whose circular was taken as the text of the article referred to, writes to inform us that, so far as his road is concerned, such circulars are not left to shirk for themselves and be covered up under several thicknesses of later circulars, but are kept in compact form ready for easy reference; and he has sent us a copy of his time table showing how this is done.

This time table, the leaves of which are 10 × 12 in. has at the back part 10 solid pages containing abstracts of orders issued by the General Manager during the past seven years. These are printed in the order of their date, and the station agent who is disposed to hang such notices among his circus and excursion posters is thus effectually circumvented. This time table also contains a number of other features which are somewhat unusual. There is a list of the general officers of the road, and this not only includes all branches of the service, but is supplemented by one giving the names of the train dispatchers, conductors, divided into five classes, and baggagemasters; station and ticket agents, attorneys for the company in different states, and surgeons. These are followed by a list of flag stations and private sidings, giving the location of each; a list of all turnouts, giving location and capacity; a similar list of private sidings, and one of the location and capacity of water tanks and wood racks, one of stock pens, of track scales, with their capacity, and of bridges over 100 ft. in length. Next comes a table showing the clearance of bridges, with a diagram showing the maximum space that a car can occupy and how the load is to be measured; and, finally, a list showing the rated capacity of each freight engine over each division of the road.

All these features are good and deserve to be imitated. The actual value of any one of these lists, taken by itself, may not be very great, but the time table is the most widely and most carefully circulated document in railroad service and is the *most frequently revised;* and the custom of making announcements in it tends to kill out the practice of keeping before the employés documents and parts of documents that are out of date. Names of officers and of places are among the things most likely to be neglected, or to be corrected by agents without proper care.

But as to instructions about ways of working, we should hope that most managers would not only follow Col. Haines' plan, but go still further. There are 171 of his circulars in this time table, and many of them are highly important. In fact, some of them are definitely titled as amendments to certain of the general train rules. Now, the practical point in connection with a rule is to get the employés to read it; and, in the case of a subject not readily kept in mind, to get them to refer it as often as the interest of the service requires. Practically, men will not do this as they ought, unless the rules are easily accessible; unless their meaning can be got at without much searching or much thinking. Therefore the ideal way is to print each new circular in its appropriate department in the general code. A man reading, for instance, train rule 99 in the code will, perhaps, remember that it is supplemented by a circular which can be found in the back part of the time table; but if he does not remember the number or the date of the circular he may have to hunt some time before he finds it; the lazy men will not do this hunting. If every man would carefully note in his copy of the rules the dates and numbers of circulars affecting the rules it would partially remedy this difficulty; but even if this were a complete remedy occasional revision of the code, to embrace all alterations up to date, would still be necessary, and it is the desirability of more frequent revisions of this kind that we are now urging. The magnitude of the labor and expense involved in such a revision are the only arguments against it, and this we fully recognize; but is it as great as is supposed?

A task demanding one week's time is felt to be an intolerable burden if only three days are available for it; but this irksome feeling is often allowed to postpone work the need of which is far beyond comparison with the cost of the few days' time of a competent man. The *Railroad Gazette's* advice to railroad officers is generally drawn from practical railroad experience, and it seldom or never has suggested newspaper wisdom as applicable to railroad work; but we will venture the opinion that if the methods of large printing and publishing houses were more closely studied, many managers would feel much less complacency than they now do in putting up with rule books which are out of date, pasted over with scraps and buried in the back part of desks. More work at revising—or the critical examination necessary to decide that revision is not needed—would be good for most division superintendents and train masters. Literary accuracy is good for operating officers as well as for consulting engineers. Some codes of rules fail to receive necessary revision, because they have been issued in too costly paper and binding. Unless one is willing to have his rules regarded as perfect he should provide for revising them; and this provision, if made at all, should be well considered. Time table forms are kept standing at the printer's permanently. While we are not prepared to advise this course with the type used to print general rules, the question is worth thinking about. The practice of questioning men on the general rules is coming to be appreciated, and, although making slow progress, will by and by be common enough to compel recognition of its utility; and then the necessity of keeping all the rules constantly in "good form"—to give a definite meaning to a somewhat vague term—will be apparent to all. It will be a definite aid to progress if the idea of keeping the code constantly revised to date is put in effect at once.

Annual Reports.

Atchison, Topeka & Santa Fe.—This report is for the year ending June 30, 1890. It gives the results of operation on an average mileage of 7,111 miles; the figures for the St. Louis & San Francisco, 1,329 miles, being given separately. The total miles of the system at the date of the report were 8,963.37. This was, of course, before the acquisition of the Colorado Midland, 274 miles. The introduction deals principally with the Plan of Reorganization of October, 1889, and with the acquisition of the St. Louis & San Francisco. All of this is now ancient history. It is said that on Oct 15, 1890, there remained outstanding less than 1½ per cent. of the $148,466,000 of bonds required to be deposited under the plan of reorganization and that "deposits under the plan continue."

Since the reorganization there has been a general consolidation of offices and working staffs, resulting in economy in administration and in more efficient service. Certain heavy terminal charges have also been saved. During the 18 months up to June 30, 1890, there were no extensions of the system, by consolidation or otherwise, except by the acquisition of the St. Louis & San Francisco. The following statement is made concerning the necessary heavy expenditures on track, etc:

"When your board assumed direction of your company's affairs, there were 2,058 miles of new railroad lines which had been within a short period of time opened for operations, but which had not been in many instances completed for ordinary economical as well as safe working. This mileage from its incomplete state was expensive to operate, and its local traffic almost wholly undeveloped. In bringing up the roadbed and tracks of these lines to a standard essential to a proper return from operations, and to a condition consistent with safety, your directors found it necessary to make reasonably large expenditures, notably on the Chicago line and the Gulf, Colorado & Santa Fe Railway, for ditching, filling, additional side tracks, buildings, and for other necessary purposes. To accommodate the increased traffic incidental to the acquisition of the St. Louis & San Francisco Railway, the main line of which connects your Gulf, Colorado & Santa Fe Railway at Paris, Tex., the Paris-Dallas branch of the latter road was found to require almost entire rebuilding."

The money for these expenditures was provided for in the reorganization.

Up to August, 1889, much new equipment was stored, but since that time the traffic has called for more equipment than the company had at its command. Provision for additional cars and engines has been made since the close of the fiscal year.

Below are given figures of the results of operation. The increase in freight earnings is notable. The decrease in earnings from passengers and express is attributed to the "reaction from the Southern California boom."

	1889-90.	1888-89.
Earnings:		
Freight	$21,733,153.61	$17,914,975.22
Passenger	6,610,033.78	7,199,994.35
Mail	742,916.79	721,323.71
Express	764,552.67	878,101.18
Miscellaneous	1,153,700 18	858,474.44
Total	$31,004,357.03	$27,572,868.90
Operating Expenses:		
Maintenance of way	$4,525,043.48	$4,139,476.14
Maintenance of buildings	227,705.98	237,270.16
Maintenance of rolling stock	2,669,467.63	3,420,571.11
Transportation and traffic exp.	12,641,969.32	12,146,699.88
General expenses	857,099.87	857,060.90
Total	$20,920,386.26	$20,800,478.19
Net earnings	$10,083,970.77	$6,772,390.71
Average operated mileage	7,110.95	7,089.25
Average per mile:		
Gross earnings	$4,335.52	$3,910.70
Operating expenses	2,862.88	2,876.33
Net earnings	$1,472.64	$1,034.37
Total revenue train miles	22,284,699	20,360,689
Per revenue train mile:		
Gross earnings	$1.39	$1.35
Operating expenses	.94	1.02
Net earnings	.45	.33

Certain traffic statistics are as follows:

Tons carried	7,741,658; increase, 982,417
Ton miles	1,769,828,696; increase, 367,036,854
Average haul	228.61 miles; increase, 21.07 miles
Rate per ton per mile	1.228 cents; decrease, 0.05 cents
Passengers carried	4,235 671; increase, 17,326
Passenger miles	295,234,950; decrease, 2,573,096
Average journey	69.70 miles; decrease, 0.90 miles
Rate per passenger per mile	2.234 cents; decrease, 0.186 cents

The income account in brief is, *for nine months:*

Net earnings		$7,632,348
From other sources		854,201
		$8,486,549
Fixed charges	$7,471,067	
Sundry discounts and losses	47,217	
Paid to St. Louis & San Francisco	198,132	7,716,416
Balance		$770,133
Loss liability for deficit of auxiliary roads not in general account		321,940
Surplus June 30, 1890		$448,194

The footings of the general accounts reach the enormous total of $343,041,613.88. The capital stock is $102,000,000; the funded debt $231,655,471. In the assets "franchises and property" appear for $81,000,000; "permanent investment" (stocks and bonds of leased and auxiliary lines), for $207,500,000, and the capital stock in the treasury is $11,161,000.

Great Northern.—The first annual report of the Great Northern Company and the report of the St. Paul, Minneapolis & Manitoba for seven months are alike in this respect, that results are stated without that fullness of detail which other railroads print in their reports to stockholders. Interest on bonds and six per cent. dividends on the old Manitoba stock were paid while a surplus (Great Northern) of $413,528 is shown. This latter company began quarterly dividends of one per cent. on Nov. 1.

It will be remembered that the Great Northern leased all the lines controlled by the Manitoba, guaranteeing six per cent. dividends. This was done to unify the system. In consideration of the guarantee the Manitoba turned over all the stocks and bonds in its treasury, the lessee in turn agreeing to pay off $8,000,000 of collateral five per cent. trust bonds from which the Manitoba had originally realized but $6,000,000, these bonds being payable at a premium whenever demanded. The money for this payment was obtained by an issue of $20,000,000 of Great Northern preferred stock sold to Manitoba stockholders at 50, thus realizing $10,000,000. If now we suppose that four per cent. will continue to be paid upon the Great Northern preferred, the result of the lease is to cancel the interest on the collateral bonds, $400,000, while adding $800,000 in dividends; or in other words, it now requires $1,600,000 instead of $1,200,000 for expected dividends annually. There are no other sources of revenue to the new company except those transferred from the old.

A knowledge of these facts adds interest to the figure for the year, where a surplus of $927,000 appears. The gross earnings increased one million of dollars, but the expenses decreased $50,000. One explanation is in the load for freight trains, which rose from 153 tons in 1889 to 180 tons this year. There was an increase in train mileage of 10 per cent., while motive power and conducting transportation show increases of about 1 per cent. only. No details are given, so the items wherein economy was exercised can only be conjectured. Maintenance of cars and general office expenses increased about 20 per cent.

These increases were more than offset by the saving in maintenance of way and structures, which, during the year, averaged only $275 per mile. Doubtless the Manitoba can be cheaply maintained, but such a sum as this is evidently inadequate. The report of the Com-

missioner of Labor gives $1.21 as the standard daily pay in Minnesota for a common laborer. The wages of one man per mile for eight months (supposing a section hand to receive no more) would make up the amount set apart by the Manitoba. This leaves nothing for ties, materials, work train expenses, etc., nor for repairs to buildings. It is hard to believe that a railroad in Minnesota can be properly maintained per annum for less than three times the sum named, which, if spent by the Manitoba, would have wiped out the $900,000 surplus and two of the quarterly dividends.

President Hill of the Great Northern about a fortnight ago made some severe remarks about traffic managers as a set of rascals, because of low rates, which occasioned some feeling. The Chicago *Tribune* in answer charged many sins of the same kind against Mr. Hill: one instance being a rate of 65 cents per ton on ore from Butte to Great Falls, a distance of 172 miles, and $6 per ton from Great Falls to Buffalo, N. Y., a distance of 2,100 miles. This being a 20 years' contract, and figuring out about 4 mills per ton per mile (a very low basis for a western road), it was said to be a losing arrangement. The *Pioneer Press*, commenting upon this case, says: "A perusal of the Great Northern report will convince any one that the company gets more net revenue from the rates above named (less than five mills per ton per mile) than it did when it received $400 per car for the haul from St. Paul to St. Vincent." In the absence of details, we may assume that the analysis of expenses above made is correct. If this be so, and if the Manitoba must cut down its maintenance of way to $275 per mile in order to accumulate dividends, it follows that the ore rates of the Manitoba do *not* yield (as claimed by the *Pioneer Press*) enough net revenue to warrant so low a quotation. The severe remarks of President Hill about other railroad men seem hardly justified.

John B. Aulman, a brakeman of the Philadelphia & Reading, who was tried under a criminal charge in connection with a fatal rear collision on Nov. 2, was acquitted when brought before the court at Norristown, Pa., Dec. 5, the district attorney withdrawing his plea for conviction when it was shown that the railroad company had failed to provide Aulman with a book of rules. There was apparently no denial of the fact that the train was not properly protected by flag, and that Aulman's place was the one whose office it was to do the flagging; but on the simple question of how or when he was taught his duties the prosecution broke down. It may be that the case was dropped for other reasons; certainly many such cases in the past have been allowed to lapse for no apparent reason except sympathy for the accused, or lack of energy on the part of the prosecuting officer, or a feeling that the punishment of the principal offender alone would still leave a number of other guilty ones unpunished, and so be in a sense unfair; but the case as reported is illustrative of a considerable class, and should therefore be noted. Two or three railroad managers have lately instituted criminal proceedings against negligent trainmen, and others will doubtless follow this example; and there are indications that the investigation of collisions is likely to come before the courts in a more businesslike manner in the future than heretofore; but it behooves those who wish to promote the public welfare in this way to be sure of their ground. At the rate lawyers usually pick flaws in any kind of a document and any line of argument or of evidence, they would have little trouble in clearing negligent flagmen on a good many roads besides the Reading. If Aulman had had a book, the question would only have been pushed along one notch; his lawyer would next try to show that he hadn't found, or hadn't been shown, the particular rule under discussion, or that the language was ambiguous or confusing. And then, if he knew the rule, a claim that he had been out too many hours or evidence that he at some times was overworked would influence a jury sufficiently to soften the verdict down to a point where it would be of little public benefit. Punishments under the criminal law are doubtless needed, as wholesome lessons, in several lines of railroad service, but there is no use in continuing the succession of farces that have heretofore wasted the time of the courts and deceived the public. To secure conviction of individuals before a court and jury on a serious criminal charge requires a strong network of facts and reasoning at best, and in cases like those we now speak of, where there are few precedents in favor of the law, the task is doubly hard. The business of (physically) "conducting transportation" is an exceedingly complicated one, and when a man is going to be convicted of doing his part of it negligently, it is important to show that all other parts of the machine generally work well; but this cannot be done without much thought and labor.

The Peninsular division of the Chicago & Northwestern, the business of which is chiefly carrying ore from the mines in northern Michigan to Lake Superior, is claimed by its friends to be the busiest single track road in the country, and a copy of the summer time table has been sent to us in support of this statement. While a time table does not prove the case, owing to the varying customs of different roads as regards running additional sections of regular trains or special trains on telegraphic orders, the appearance of this table goes far to substantiate the claim made. Its leaves are 13 × 23 in., and the time table for trains in one direction between Escanaba and Antoine runs across a double page, making virtually one table 39 in. wide. The distance between the points named is 53 miles, divided as follows:

ESCANABA.	
9	double.
NARENTA.	
26	single.
WAUCEDAH.	
18	double.
ANTOINE.	

The single track portion, it will be seen, is in the middle of the division. There are two passenger trains each way over about half the division and three each way over the remainder. Various trains begin and end their runs at places other than the termini, but the list foots up 36 or 37 freight trains each way daily over the 26-mile section of single track. The schedules of these trains each show from four to eight meeting points between Narenta and Waucedah, not counting either of these places, the average number of meeting points for each train being six. Many of the notes indicate that two trains are met, and some of them indicate that two are met and one is passed. There are 13 stations where trains can meet, and the average distance between them is 1.91 miles. Of course, the difficulty in running these trains, and, consequently, the degree of skill required, depends largely on the length and arrangement of the sidings or loop tracks by which these meeting points are passed. On this point we have no detailed information, but, in a general way, the "hot" condition of the tracks is indicated by the fact that for the nine miles out of Antoine, where there is a double track, the three passenger trains use one of unning in both directions—that is, the north track is used for both east-bound and west-bound passenger and east-bound freight trains, while west-bound freights have the south track wholly to themselves. The exceptions to the general rule giving trains moving toward Escanaba the absolute right of track make a long paragraph.

The last boat of the season passed through the Sault Ste. Marie Canal on the 3d inst., and the canal is officially closed, with 228 days of navigation from April 20th, as against 234 days last year. Although to the six days shorter season must be added a loss of 88½ hours through the breaking of a lock valve, the business done shows an increase of 20 per cent. over that of 1889, and last year showed a like advance on the business of 1888. The principal items of the last two years' business are as below:

	1890.	1889.
Vessels, number	10,597	9,579
Lockages, "	4,970	4,684
Registered tonnage net	8,454,455	7,221,935
Freight towage, net tons	9,041,213	7,516,022
Passengers, number	24,856	25 112
Coal, net tons	2,076,925	1,529,197
Flour, barrels	3,239,104	2,228,707
Wheat, bushels	16,217,370	16,231,854
Other grain, bushels	2,133,245	2,044,394
Iron ore, net tons	4,774,768	4,095,857
Manufactured and pig iron, net tons	116,327	57,560
Salt, barrels	179,431	168,250
Copper, net tons	43,729	33,456
Silver ore, net tons	3,432	5,947
Lumber, 1,000 ft. B. M	311,929	315,854
Unclassified freight, net tons	371,291	312,410

The freight carried this year is valued at $10,221,870, as against $8,373,254,715 for that carried in 1889. There is a slight decline in the number of passengers and in silver ore. The decline in grain transported is more than made up by over one million more barrels of flour. The total increase of freight, 1,525,190 tons, and of registered tonnage, 1,232,500, is important.

Senator Sawyer, of Wisconsin, has this week introduced a bill in the United States Senate to amend Section 5 of the Interstate Commerce law so as to provide that agreements for the apportionment of traffic may be entered into between common carriers, subject to the provisions of the act. The bill proposes that the Commission shall have power, after hearing parties interested, to suspend any such agreement the purpose or effect of which shall be to maintain transportation charges above reasonable rates or to cause unjust discrimination between persons. It is understood that the committee will give a hearing on the bill this week.

NEW PUBLICATIONS.

Report of the New York Produce Exchange for the year ending July 1, 1890, with the Charter, By-Laws and Trade Rules adopted by the Exchange and a List of Members.

This is a volume of about 500 pages, containing a great body of information of interest and frequent use to the student. The statistical report prepared by J. G. Brown, Statistician of the Exchange, occupies the last 140 pages. It consists entirely of tabular matter, with a pretty complete index.

Metallurgy of Silver, Gold and Mercury in the United States. Vol. 2: *Gold and Mercury.* By Thomas Egleston, LL. D., Professor of Mineralogy and Metallurgy, School of Mines, Columbia College, New York. John Wiley & Sons. 1890.

The first volume of this treatise was published in 1887, and from the author's preface it appears that still a third volume, on silver bearing lead ores, is to be expected. This volume contains 920 pages, with a copious index and many illustrations.

Proceedings of the Engineers' Club of Philadelphia. December, 1889.

This issue contains two or three papers of special interest. The longest is one of 24 pages, by Mr. F. J. Amweg, on the Market Street Cantilever Bridge of the Schulkill River, Philadelphia. This structure was completed May 1, 1888. It carries a double street railroad track and a roadway on either side, and has besides two sidewalks.

Another paper, of nine pages, by Mr. C. B. Hunt, describes the repairing of the foundation of a pier of the Aqueduct Bridge, Washington, D. C., which was damaged by the great flood of June, 1889. A cavity was scoured under the north edge of the foundation, 4 ft. deep and running back 6 ft. under the pier. The depth of the foundation was 35 ft. below the water level, the total height of masonry being 65 ft. The settlement of the pier produced a movement of the top of about 3½ in. The cavity was filled with concrete, lowered in bags and placed in position by divers. The repairs occupied 11 days. No attempt was made to restore the pier to its vertical position. The concrete is protected by a considerable amount of rip-rap. The cost was $3,112 for the concrete and $1,394 for the rip-rapping.

Another very short paper is by Mr. P. F. Brendlinger on Pumps and Methods Used for Grouting the New York Aqueduct.

Directory of Technical Literature. By Fritz v. Szczepanski. First annual issue for 1889. New York: International News Co. 1890.

This is a little volume of 80 pages, very compactly printed, containing titles of books, annuals and journals published in America, England, France and Germany. It is a classified catalogue covering the literature of architecture, engineering, railroads, electricity, etc.

Messrs. John Wiley & Sons announce as in preparation "Wooden Trestle Bridges," by Wolcott C. Foster, C. E. The reader can judge of the value of this work by the papers which have been running in the *Railroad Gazette* during the last year, all of which, and much more material, will be collected in the work now in preparation. There is no work of this character in the language, and the papers which have been published by us have attracted much interest.

Transactions of the American Society of Mechanical Engineers. Volume 11. 1890. F. R. Hutton, Secretary, 12 West Thirty-first street, New York City.

This stout volume of about 1,200 pages contains the papers and discussions of the New York meeting, November, 1889, and the Cincinnati meeting, May, 1890. It also contains a list of members and the rules of the Society. There is an excellent index, by subjects and authors.

TRADE CATALOGUES.

Illustrated Catalogue of the Consolidated Car Heating Company. Albany, N. Y.; 115 Broadway, New York City; 616 Phenix Building, Chicago.

This is a very handsome catalogue, illustrating and explaining the numerous devices controlled and manufactured by this company. These cover quite fully the field of continuous train heating by steam from the locomotive, and also by hot water circulation. The Consolidated Company owns the patents formerly the property of the Sewell Safety Car Heating Company, the McElroy Car Heating Company, the Standard Car Heating and Ventilating Company (Westinghouse), the Automatic Car Heating Company of Detroit, and the Universal Car Heating Company (Leland patents). Special attention is called to a considerable list of new devices for 1890-91, including an automatic temperature regulator, the commingler storage system, the Consolidated steam coupler, etc., also the solid fireproof heater. This is a heater for water circulation, very compact in form and adapted to be placed in heater rooms cut off from the body of the car. It is a shell of 18-in. tubings, ¼ in. thick, within which is a cast iron lining, the space between the shell and the lining being filled with asbestos fire-felt. A water coil is placed in the chamber of the heater. Within the coil is a coal space, which is designed to hold a 24-hour supply of coal. This heater is provided with an improved grate rigging. The dimensions over all of the heater are 42 in. high by 18 in. diameter.

Illustrated Catalogue of the Bridgeport Machine Tool Works. E. P. Bullard, proprietor, Bridgeport, Conn. October, 1890.

This catalogue shows and describes boring and turning mills, bolt cutters, lathes, screw machines, etc. The illustrations are well cut on wood and handsomely printed.

Illustrated Catalogue of Pedrick & Ayer, 1003 and 1005 Hamilton street, Philadelphia, Pa.

This catalogue shows a great variety of machines and special applications, many of which have been illustrated from time to time in the *Railroad Gazette.* These include Richard's open side planing and shaping machines, universal milling machines, cylinder boring machines, and special tools for railroad repair shops. Like the two other catalogues mentioned above, this one, by the variety and fullness of its illustrations, is a real addition to a library.

Catalogue of the Schoen Manufacturing Company, Pittsburgh, Pa.

This is a small illustrated pamphlet showing a few of the designs in pressed steel shapes manufactured by this company, such as stake pockets, centre plates, drawbar rigging, corner bands, the Schoen pressed steel dead block, brake beam, etc.

Illustrated Catalogues of the Ashcroft Manufacturing Company and the *Consolidated Safety Valve Company*, 111 Liberty street, New York City.

These are both new catalogues, recently distributed to the trade The catalogue of the Ashcroft Manufacturing Company shows steam and water gauges, revolution counters, test pumps, stocks and dies, spike cutters, vises, the Tabor indicator, Moscrop's continuous recorder and a considerable variety of other special instruments. The catalogue of the Consolidated Safety Valve Company treats entirely of pop safety valves.

Price List of Improved Hydraulic Jacks, Screw and Lever Jacks, etc. Watson & Stillman, 204 to 210 East Forty-third street, New York City. October, 1890.

Several different kinds of jacks have been added to the former lists of this well known house, as, for instance, a hydraulic car box jack. This is made with a capacity of from 4 to 10 tons; total height 11 in., lift from 3 to 6 in. Another handy tool shown is a hydraulic piston rod jack, designed to work between the cross-head pin and the end of a piston rod of a locomotive. The limited space makes a very compact tool necessary and one that can be used without hammering. This jack has a capacity of over 15 tons and a motion of ⅜ in. in the rams. It weighs complete 12 lbs. Over 100 different sizes and styles of jacks are illustrated.

TECHNICAL.

Manufacturing and Business.

Carnegie Bros. & Co., of Pittsburgh, Pa., are placing 35 Roney stokers in the Edgar Thomson Steel Works at Bradford, Pa.

The Spang Steel & Iron Co., of Sharpsburg, Pa., the Akron Iron Co., Akron, O., and the Standard Oil Co., Philadelphia, have each ordered a number of the Ridgeway hydraulic cranes.

The Carolina Oil & Creosote Co. has shipped the following material, valued at about $7,804, to be used in the construction of the Nicaraugua Canal: 103,788 ft. of creosoted piles, valued at $3,633; 129,608 ft. of creosoted lumber, valued at $4,032; 6,030 ft. non-creosoted lumber, valued at $109.

The Pennsylvania Steel Co., Steelton, Pa., has contracted with William Tod & Co., of Youngstown, O., for one of its No. 1 tables, to be placed in the new rail mill, Sparrows Point, Md.

Thomas J. Bray, Superintendent of the plant of the Paige Tube Co., at Warren, O., has been granted a patent on a machine for cold rolling metallic pipe. The company will have a half interest in the patent.

The Continental Tube Works, recently leased by T. Bisseli Everson, of Pittsburgh, Pa., is now running in full and turning out a large production of pipe daily. Mr. Everson has also leased the Elba Iron Works, which will supply skelp iron to the tube works.

The Consolidated Brake Adjuster Co., of Chicago, has been chartered in Illinois. Its capital stock is $500,000, and its object is to manufacture devices for adjusting the slack caused by the wear of brake shoes. The incorporators are Charles F. Quincy, Arthur Crandall, Richard W. Wright.

A company is being formed at Dallas, Tex., with $25,000 capital stock, to establish works to manufacture car axles, shafting, etc.

Iron and Steel.

The Illinois Steel Co. recently put a new merchant bar mill in operation in its Bay View Works, at Milwaukee, Wis.

The West End furnace at Roanoke, Va., was fired up Saturday for the first time. The Roanoke Iron Co. is also building two rolling mills, which will be completed before next summer.

The steel mill of the Bethlehem Iron Co., at Bethlehem, Pa., has been closed owing to lack of orders. One thousand men are thrown out of employment.

F. T. Aschman, of Sharon, Pa, has contracted for a five-ton open-hearth steel melting furnace, and is also fitting up a foundry and machine shop to make steel castings of all kinds. It is expected that the plant will be in working order by next January.

Hughes & Patterson, of Philadelphia, have commenced the erection of a new 140 × 120 ft. rolling mill on the site of their old one at Beach and Vienna streets. Work will be commenced on a new puddling mill, 160 × 90 ft., having five furnaces, with a total daily capacity of 60,000 lbs.

The plant of the Sterling Steel Co., located at Demmler, Pa., has resumed operations after an idleness of two weeks for repairs and additions. A new battery of four boilers has been put in, a new building 35 × 72 ft. erected. The works having returned to the use of coal, most of these improvements was made necessary.

The iron plate department of the Britton Rolling Mill Co., Cleveland, O., is nearing completion. The engine, boilers and rolls have arrived from Chicago, and are being put in position.

The large furnace "A" of the Monongahela Furnace Co., Pittsburgh, Pa., has been blown in.

The Rail Market.

Steel Rails.—There seems to be no actual business and the market is about as dull as possible. The rail mills are not inclined to close orders at present prices, believing that quotations must soon improve. The only mills making a quotation are those at Chicago, which give $30@$31.50.

Old Rails.—The quotations at New York are $22; at Pittsburgh, $27@$27.50 for old iron rails and $17.50 for short lengths of old steel rails; at Chicago, old iron rails are quoted at $23.50 and old steel rails at $16@$19.50.

New Car and Machine Shops.

A company is being organized at Ridgeville, Tenn., to establish car works. The company will purchase the planing mill and machine shop of W. B. Farrar & Co.

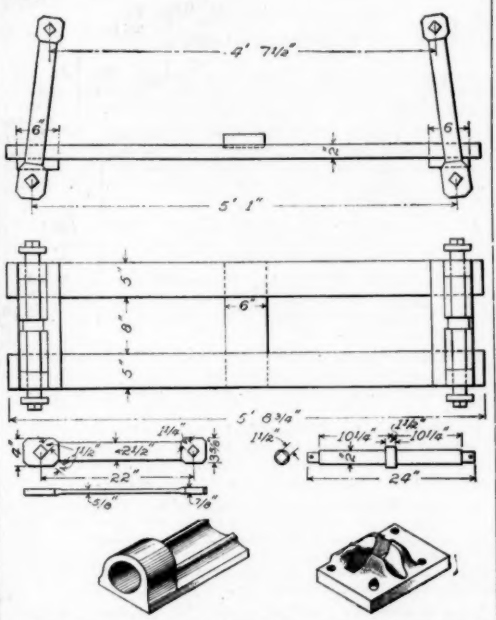
The Norfolk & Western will probably build new car shops at Shenandoah, Va., for the Shenandoah Valley division.

The Southern Pacific has commenced the erection of a new round house at Victoria, Tex.

The East Tennessee, Virginia & Georgia contemplate establishing machine shops at Rome, Ga.

Boston & Albany Spring Plank.

A novel design of spring plank for passenger car trucks is shown herewith. It was designed for the Boston & Albany passenger cars. It is constructed as follows:



Two pieces of 5×2 in. plank are secured together by oak laterals 6×2 in. rabbetted on to the spring plank as shown. The planks are carried on axles shown at *A*, and rest on carriers shown at *B*. These carriers are separated by the collar at the centre of the axle. A detail of the hangers is shown at *C*, and the top hanger bearing is given at *D*.

Test of the Norwood Car Replacer.

A test was made of the Norwood car replacer, on the tracks of the B. & O. at Baltimore, Nov. 29, under the supervision of officers of the road. A gondola car loaded with paving blocks and weighing 95,000 lbs. was derailed on a slight curve. The replacers being in position, the locomotive was started and the wheels rose on the replacers and from them to the tracks as smoothly as though passing over a switch. Several new features have recently been added to this device, which were tested at the same time. Notable among these are the substitution of a clamp to fasten the inside frog, for the wooden brace, and the manner of adjusting the clamp on outside frog. Among those present were S. B. Crawford, Master Mechanic, E. W. Grieves, Master Car Builder, and Edw. Andrews, Wrecking Master of the B. & O. The offices of the company are at 109 North Charles Street, Baltimore.

Trials of the Beals Engine Brake and Loughridge Train Brake.

We have received from Mr. James Howard, Manager of the Beals Railway Brake Co., a somewhat detailed report of the tests made of the Beals and Loughridge brakes on the Lynchburg & Durham Railroad last month. We have already mentioned the fact that that road has adopted the Loughridge train brake for its equipment.

The train on which the trials referred to were made consisted of a Baldwin 10-wheel engine, fitted with the Beals brake, six loaded freight cars and two empty ones fitted with the Loughridge brake, one combination car and a Pullman not braked.

Preliminary tests were made with the engine alone down a grade of 80 ft. per mile at a speed of 20 miles per hour. The engine was stopped in a distance of 250 ft., the boiler pressure being 120 lbs. On the same grade at 25 miles an hour the distance taken to stop was 262 ft., boiler pressure 150 lbs. Again, at 18 miles per hour, the distance run was 450 ft., boiler pressure 150 lbs. and the throttle open. The driver brake was operated by steam, and for that reason the boiler pressures are noted.

The train was run from Lynchburg to South Boston Va., a distance of 60 miles, many stops being made, and several of them repeated with, it is said, uniform results. Details of three stops are given. One on an 88-ft. down grade, speed, 40 miles per hour; time of stop, 19 seconds; distance, 574 ft. Another on a 26-ft., down; grade, speed, 30 miles an hour; time, 17 seconds; distance. 352 ft., the rails wet with drizzling rain. Another stop was made with the engine-brake alone, the air at the back of the tender being cut off; grade, 26 ft., down; speed, 30 miles per hour; time, 37 seconds; distance, 657 ft.

It is said that there was no shock in any of these stops, and that the release of the Loughridge brake is practically instantaneous, as it took but five seconds for the train to get in motion after the full stop.

The Wanamaker Car Scale.

The car scale invented by Mr. C. B. Wanamaker is a novel device designed to secure greater accuracy and dispatch in weighing freight cars. It consists in attaching to each car a system of levers similar to those of an ordinary platform scale. The levers are suspended from the car sills and so arranged that when not in use the knife-edges at all the bearings are released from contact with the hardened steel plates in order to prevent wear. The scale is operated by means of four hydraulic jacks, which act as fulcra to the secondary levers, and are fed by pipes leading from a small oil pump situated near the scale beam in the middle of the car. The short arms of the main levers bear upon steel plates which are let into the upper surfaces of the truck bolsters. When the oil pump is worked the jacks act upon the levers and lift the car body clear of the trucks. The reading is then taken at the scale beam. The scale beam is fitted with the usual counterpoise and sliding weights, as well as an adjustment. With the oil pump, it is encased in a box, the door of which cannot be closed till the jacks have been released.

The Wanamaker Car Scale Co., of Indianapolis, Ind., have equipped a standard freight car with the apparatus, which will be taken to the prominent railroad centres for exhibition.

Nickel Steel at the Homestead Works.

The recent test of the nickel steel armor plate at Annapolis has been supplemented by Carnegie, Phipps & Co., at their works, near Pittsburgh. Two tests were made on Dec. 5 with specimens taken from a five ton heat in a Bessemer converter. A chemical analysis of the French metal shows a percentage of nickel of 3.32, while that of the Pittsburgh metal is 3.16. A part of this heat was rolled into three-quarter-inch plates from which a number of specimens were cut. The first test gave an elastic limit of 50,000 lbs., ultimate tensile strength of 100,000 lbs., elongation 15½ per cent. and reduction of area at fraction 29⅓ per cent. The second test gave an elastic limit of 60,000 lbs., ultimate tensile strength, 102,000 lbs.; elongation, 15½ per cent., and reduction of area at fraction, 26⅓ per cent.

A Government Contract.

The Government has awarded the American Dredging Co., of Philadelphia, a contract for completing the work of widening and deepening the ship channel to Baltimore. The work will cost nearly $750,000.

The East River Tunnel.

The New York Board of Aldermen last Tuesday granted a franchise to the New York & Long Island Railroad Company. The project of this company was very fully described in the *Railroad Gazette* of May 9, p. 318. It is proposed to connect the New York Central & Hudson River Railroad with the Long Island Railroad by a very carefully worked out scheme of tunnels. The project has been before the New York aldermen for three years, but until now the franchise has been withheld. It was finally secured with considerable difficulty, the vote being 14 in favor and 11 against. One member of the board was not present.

THE SCRAP HEAP.

Notes.

Three yard brakemen were discharged by the Union Pacific at Ogden, Utah, about ten days ago. The result was a strike of the night men, and on Monday last the entire force of the union and non-union men left their work.

Thirty-seven yard brakemen of the Baltimore & Ohio, at Pittsburgh, struck last week because of the arrest of three men who broke into a shanty. As a result of the strike the Pittsburgh Junction road was blockaded and the entire Pittsburgh division was considerably embarrassed. The company expected to get sufficient new men by Thursday of this week.

Pullman dining cars have been put on the fast overland mail train between Ogden and Truckee. The Union Pacific which now runs dining cars on the fast mail between Portland and Omaha, via Green River, will put on a car between Green River and Ogden, thus making a through dining car service from Truckee to New York, via Ogden and Omaha. The Rio Grande will probably establish a dining car service between Ogden and Denver, Colorado Springs and Pueblo.

The Rio Grande Western has presented to the county attorney at Salt Lake two petitions requesting the closing of the saloons at Helper and Clear Creek on the line of that road. The petition represents that at these two stations a large number of the inhabitants are railroad men, that a large number of them are patronizing said saloons, and the saloons are a constant temptation to them. The employés are engaged in serving the public in a dangerous employment, therefore the saloons are a source of great danger. The attorney for the company asks a hearing before the court to explain the reason for asking this action.

An Egyptian Railroad Project.

For some time it has been thought desirable to connect Port Said with Cairo by a direct railroad, but the influence of Alexandria has so far been too powerful in opposition to the project. The Suez Canal Company, which fortunately owns a right of way on both banks of the canal, is now quietly taking steps to connect Port Said with Cairo through Ismalia, which is already connected with Cairo. They are building a Decauville railroad along this right of way "for the service of the canal," which is to be completed within two years. As the grading is made of a width sufficient for a standard gauge road, it is thought that on completion of the Decauville road the public demand for the convenient use of the new road will be so strong that the interests of Alexandria will not be able to keep it from public use.

The Intercontinental Railway.

The Intercontinental Railway Commission, composed of representatives from the United States, Mexico, Guatemala, Costa Rica, Colombia, Ecuador, Venezuela, Peru and Brazil, met for organization at the Department of State, Washington, Dec. 4. Secretary Blaine opened the meeting. Mr. A. J. Cassatt was elected president of the Commission. The Commission then adjourned to meet again on Thursday of this week.

A Condensed Description, by One Who Knows.

The general passenger agent is the most important man on the railroad, at least those that ask favors of him think so. . . . His duties are as varied and as arduous as there are days in the month. On Sunday he must attend church to prove that the railroads set a good example to the community. Monday night he must take a party of ticket agents to the theatre and show them about town in order that they may be impressed with the liberality of the company, and in the hope that they will send their business over his line. At an early hour on the following morning he must meet the general manager at the office to discuss plans for the reduction of expenses. Wednesday he must convince the advertising agent of each one of the daily papers that he is paying him more money for time-tables and reading notices than any other paper in the country. Thursday he devotes to trying to get a lot of reading notices into the papers *free*, upon the plea that they are really items of news. Friday he spends in making a map that shows his line to be the shortest and most direct route to every important point in the United States. Saturday he makes out a time-table that no one but the

maker can read. He goes home Saturday night with the proud consciousness that he has done a splendid week's work and earned his princely salary.—*Geo. H. Daniels, speech at Denver.*

The New Wisconsin Central Station at Chicago.

The new "Grand Central" station at Fifth avenue and Harrison street, Chicago, erected for the use of the Wisconsin Central, was formally opened Dec. 8. The Federal flag was unfurled on the lofty tower by a delegation from the Grand Army of the Republic, and there were dedicatory exercises inside the building. The main building is of brownstone, granite, pressed brick and terra cotta. At Harrison street and Fifth avenue it is six stories high, and the wings, extending 278 ft. on Fifth avenue and 268 ft. on Harrison street, are four stories high. From the corner rises a tower 28 ft. square and 221 ft. high. The interior appointments are elegant and complete. The train shed is 553 ft. long, 149 ft. wide and 82 ft. high.

Palace Cars in Belgium.

The Belgian railroad department is at present experimenting with a palace car designed specially for international traffic. The car is longer, wider and higher than the regular car used in the Belgian roads, and the interior finish is of a much more elaborate character. The cost of the car was about $8,600. If it be found that the dimensions of the car will not interfere with all the requirements of satisfactory performance, it is proposed to use a number of that type on the Ostende-Berlin and the Brussels-Namur-Luxembourg lines.

British Shipping Disasters.

From a "Blue Book" lately issued by the British Board of Trade on the above subject, *Industries* shows that for the past 13 years, ending with June 30, 1889, the average total losses of British vessels of all kinds has been 1,049, involving a loss of 299,084 tons each year; but each year since 1884 the losses in tonnage have been below the average. Last year the total *casualties* to British vessels was 7,716 and the number of *total losses* 753 vessels, with an aggregate tonnage of 233,708 tons. The total loss of life was 2,233, which was 301 less than in 1888 and a 1,221 less than in 1887, when 284,326 tons were lost. The "missing" vessels were 51, and the founderings were also 51. Among the casualties 1,320 vessels were stranded, 1,183 vessels were in collision, and 1,701 casualties were ascribed to "other causes."

Inter-American Transportation.

A company has lately been incorporated under the laws of Alabama called the Pan-American Transportation Company, with an authorized capital of $50,000,000, by men mostly resident on the Gulf Coast, which proposes to run steamer lines to the West Indies, to ports on the Gulf and in South America, from Mobile and Galveston. As these two points are very nearly equidistant from the great centers of the grain traffic, it is easy to see what regions will be best served by each port. But of the two ports Mobile will probably be much the most important, for it has already developed a considerable export trade in coal to island and Gulf ports, and coal insuring a freight of some sort to nearly every port, will make the port handling it a favored one, giving it the cheapest freight and giving the greatest encouragement to the production of exportable produce in the section of country it serves.

The New Orleans *Picayune*, commenting on the growing coal and other trade of Mobile, particularly with Cuba and Jamaica, says it is for the benefit of the entire South, the most important fact being that Southern ports are increasing this trade with foreign nations whether that trade is from New Orleans or Mobile; also, that the increase of exports shows that the contiguous country is filling up with population and business.

Burning of Bridge Works.

The machine works and blacksmith shops of the American Bridge Works, at Roanoke, Va., were destroyed by fire Dec. 2. The loss is about $10,000, covered by insurance. The foundry building was saved.

Lake Superior Ore Shipments.

The toral shipments by lake of iron ore from the Lake Superior mines have been 8,145,850 tons, according to the Marquette *Mining Journal*.

The shipments have been by ranges:

	Tons.
Marquette	2,656,423
Gogebic	2,460,569
Menominee	2,155,010
Vermillion	870,848

And by harbors the shipments were:

	Tons.
Marquette	1,316,353
Escanaba	3,742,519
Ashland	2,109,555
Two Harbors	870,848
Gladstone	90,254
St. Ignace	15,911

The gain over the lake shipments of last year has been 1,241,339 tons or 17.95 per cent. It is expected that the shipments by rail will certainly reach 400,000 tons, making the total output for the year at least 8,500,000 tons, so that the Lake Superior mines will apparently furnish ore for about one-half of our make of pig iron this year.

Pass Agreement of Chicago Roads.

The Chicago roads have made an agreement for passes for 1891, the principal features of which are: No annual or time passes to employés of roads except upon request of officials; half fare permits to be good in only one state; no time passes to agents of roads engaged in the sale of coal or other commodities; no passes, mileage tickets or other forms of transportation to be issued to influence either freight or passenger business. The regulations concerning trip passes are somewhat less rigid than the above. The World's Fair commissioners, Grand Army officers and employés of refrigerator car companies are specially cut off in both sections of the agreement.

LOCOMOTIVE BUILDING.

The New York, Lake Erie & Western has contracted with the Baldwin Locomotive Works for ten 10 wheel passenger engines, and with the Cooke Locomotive Works for five 6-wheel switchers, class "H," to be delivered in March. These are a part of the 25 for which bids were recently asked.

The Delaware, Lackawanna & Western has asked bids from the Cooke, Dickson and Rogers Locomotive Works, which are on the line of its road, for a number of engines, to include consolidation, mogul, heavy switching engines and some passenger locomotives. It is said that about 20 engines will be ordered.

CAR BUILDING.

Black, Sheridan & Wilson are receiving the first installment of a number of new 25-ton coal cars which will be operated on the Baltimore & Ohio. They have steel axles, centre plates, and corner plates, graduated springs, and are fitted with the continuous drawbar.

The Chicago, St. Paul, Minneapolis & Omaha has received three new sleeping cars from the Pullman Palace Car Co. They will be lighted by the Pintsch gas system and also have electric light fixtures.

The Buffalo Car Mfg. Co., of Buffalo, N. Y., has just finished an order for 200 box cars of 50,000 lbs. capacity each for the Delaware, Lackawanna & Western.

A new vestibuled train to cost $100,000 will soon be delivered from the Pullman shops to the Richmond & Danville for use between Atlanta and Washington.

BRIDGE BUILDING.

Aspen, Col.—The King Iron Bridge Mfg. Co., of Cleveland, O., has been awarded the contract for an iron bridge over Castle Creek, at Aspen, at $17,280.

Augusta, Ga.—The Milwaukee Bridge Co., of Milwaukee, Wis., has been awarded the contract for the construction of the steel bridge across the Savannah River, to be built by the North Augusta Land Co. Bids for the work were received Oct. 20.

Boston, Mass.—The aldermen have voted to borrow $300,000 for the construction of a bridge connecting the proposed extension of Congress and G. streets.

Chicago.—W. H. Purdy, Commissioner of Public Works, will receive bids until Dec. 16 for building a Howe swing truss bridge over the Chicago River at Thirty-fifth Street.

Colorado Springs, Col.—The contract for a 120 ft. iron bridge to be erected at this place, has been awarded to the King Iron Bridge Mfg. Co., of Cleveland, O., for $6,450.

Des Moines, Ia.—Bids will be received by the Board of Public Works until Dec. 20, for the construction of a three-span iron and steel bridge, with tubular piers, across the Des Moines River, at Walnut street.

Duluth, Minn.—Plans for a railroad and wagon bridge to be built across the St. Louis River, between New Duluth and St. Louis town site, have been drawn. The structure, with approaches, will be 3,000 ft. long, and have a 225 ft. draw. It will probably be built by the Duluth, Red Wing & Southern.

Fort Worth, Tex.—H. H. Kerr, City Engineer, states that the central span of the North Side bridge is in a dangerous condition, and recommends the construction of a 100 ft. span from the south end of the main span to the lower abutment, and that the cylinders be removed and replaced with 6 ft. cylinders down into the rock.

Joliet, Ill.—The contract for the construction of a steel bridge, consisting of three spans, over the Des Plaines River at Joliet has been awarded to W. D. Wheaton, of Chicago, for $6,500.

Kansas City, Mo.—Proposals are wanted until Dec. 12 for the construction of a bridge over Turkey Creek, by J. S. Cannon, President of the Board of Public Works.

Marble Falls, Tex.—The citizens of Marble Falls have succeeded in raising the required amount to begin work on the construction of an iron wagon bridge across the Colorado River, the contract for the building of which has already been let.

McKeesport, Pa.—The Port Vue Bridge Co., recently organized to erect a bridge across the Youghiogheny River at the foot of Thirteenth Avenue is having the plans and specifications for the structure prepared, and it is expected that the work of erecting the bridge will be commenced about Jan. 1.

Millford, Man.—The new bridge of the Canadian Pacific, spanning the Souris River at Millford, was opened for traffic on Nov. 29. The structure is 3,300 ft. in length and is, on an average, 75 ft. high. It has a Howe truss span of 155 ft. The quantity of material used in the construction was 1,300,000 board measure, and 1,350 piles were driven for the support of the trestle, and 150 piles support the abutments on which the Howe truss rests.

Morganton, N. C.—A high iron bridge is contemplated to be built over the Catawba River at some point near Morganton.

Oakland, Cal.—Separate bids will soon be wanted for the piers and iron work for a drawbridge over the tidal canal, between Oakland and Alameda, at Park street.

Omaha, Neb.—The East Omaha Land Co. is reported to have accepted plans for a new railroad and wagon bridge across the Missouri River at this point, to cost $1,500,000.

Payette, Idaho.—It is reported that work on the new wagon bridge across the Payette River at this place will be commenced soon.

Pittsburgh, Pa.—The Upper Bridge Co., of Pittsburgh, has been chartered with a capital stock of $200,000, to construct a bridge over the Monongahela River in the Twenty-third Ward. The directors are: James D. Callery, John C. Reilly, Wm. J. Burns, Charles G. Milnor and Wm. M. Callery, of Pittsburgh.

St. Louis, Mo.—The Wabash has agreed to pay one-half the cost of the re-construction of the Duncan avenue bridge, provided it is raised two feet, so as to give the company 18 ft. of headway instead of 16 ft., as at present. The total cost will be $15,000.

The work on the new steel bridge at Broadway, across the River des Peres, is rapidly nearing completion.

St. Paul, Minn.—Charles F. Loweth, Consulting Engineer of St. Paul, Minn., has completed plans for the three bridges for the Minneapolis & St. Louis Railroad, the contract for one of which has been awarded to the Lassig Iron and Bridge Works, of Chicago, for $15,000.

Seattle, Wash.—Some trouble has arisen in regard to the bridge of the Belt Line across Cedar River. The company was to have built a pile bridge, but it is claimed by the United States engineers that the river is navigable and they demand that a drawbridge be built. Work will be discontinued until the settlement of the question.

Weldon, N. C.—It is stated that the Atlantic Coast Line contemplates building an iron bridge across the Roanoke River, at Weldon. The company has been using the bridge of the Seaboard Air Line for a good many years.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Albany & Susquehanna, $3.50 per share, payable Jan. 2.
Augusta & Savannah, semi-annual, 3½ per cent.
Boston & Albany, $2.00 per share, payable Dec. 31.
Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, payable Jan. 2; and semi-annual, 1½ per cent. on the common stock, payable Jan. 5.
Lehigh Valley, quarterly, 1¼ per cent., payable Jan. 15.
New York Central & Hudson River, 4 per cent., payable Jan. 2.
Rio Grande & Western, 2½ per cent. on the preferred stock, payable Feb. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, annual, Addison, N. Y., Jan. 12.
Albemarle & Pantego, annual, Norfolk, Va., Jan. 20.
Boston & Lowell, annual, Boston, Mass., Jan. 7.
Central of Georgia, annual, Savannah, Ga., Dec. 23.
Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 7.
Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 13.
Housatonic, annual, Bridgeport, Conn., Dec. 16.
Kings County (Elevated), annual, Brooklyn, N. Y., Jan. 14.
Lehigh Valley, annual, Philadelphia, Pa., Jan. 20.
Little Schuylkill, annual, 410 Walnut street, Philadelphia, Pa., Jan. 14.
Mine Hill & Schuylkill Haven, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 12.
Nesquehoning Valley, annual, 226 South Third street, Philadelphia, Pa., Jan. 12.
New York, New Haven & Hartford, annual, New Haven, Conn., Dec. 17.
New York, Ontario & Western, annual, 18 Exchange place, New York City, Jan. 21.
Norfolk & Western, annual, adjourned, Roanoke, Va., Dec. 15.
North Pennsylvania, annual, Philadelphia, Pa., Jan. 12.
Norwich & Worcester, annual, Worcester, Mass., Jan. 14.
Philadelphia & Reading, annual, Philadelphia, Pa., Jan. 12.
Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 12.
Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 27.
Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 20.
Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 29.
St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 13.
Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan. 5.
Terre Haute & Logansport, annual, Terre Haute, Ind., Jan. 5.
Toledo & Ohio Central Extension, annual, Marietta, O., Jan. 12.
Virginia Midland, annual, Alexandria, Va., Dec. 17.
Western & Atlantic, annual, Atlanta, Ga., Jan. 21.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Southern & Southwestern Railway Club will hold its next meeting in Atlanta, Ga., Jan. 15.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month. at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday, of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p.m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room

200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* generally holds its meetings at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The *Civil Engineers Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m. The annual meeting will be held on the third Wednesday in December.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

Southern & Southwestern Railway Club.

The Southern and Southwestern Railway Club held its second regular meeting at the Maxwell House, Nashville, Tenn., Nov. 20, 1889 at 10 a. m. Vice-President J. J. Casey occupied the chair.

The first subject under discussion was "Types of heavy locomotives best suited for heavy passenger and freight service." No paper had been prepared on this topic, but Mr. James Meehan, S. M. P. of the Q. & C. system, made a few remarks advocating the use of eight wheeled four coupled engines for all service when the cylinder is 18 in. or less. Mr. Meehan recommends the ten wheeled locomotive for heavier passenger work and the consolidation type for very heavy freight service.

Mr. P. Leeds, S. M. P. of the L. & N. Ry., agreed with Mr. Meehan generally, but spoke warmly of the safety of the mogul type for every class of service. Mr. Leeds also endorsed the rigid pony truck as opposed to the swing motion truck.

In the discussion which followed much was said in favor of deeper fire boxes and the use of the fire brick arch.

Then followed a paper on "Joint Car Inspection," by Mr. J. J. Casey, S. M. P. of the L. N., O. & T. Ry.

Mr. Casey said in substance that the question of joint car inspection, while being an old one in the Eastern, Middle and Western states, is new to the South and Southwest. The delays incident to a "straight system" of inspection are avoided by the use of the joint inspection. There are three distinct systems in common use.

First—That in which the joint inspector is selected by the heads of car departments of all the roads interested, and himself employing all the other inspectors, moving them from point to point at will, and dividing the expense between the roads pro rata.

Second—That in which each road employs its own inspectors, and places them in charge of a joint inspector only in so far as pertains to inspection of cars for interchange.

Third—That in which each road employs its own car inspectors, and depends upon them to look out for its interests. When not engaged in inspecting interchange cars, these men can be utilized to make minor repairs. The joint inspector is simply an arbitrator between the inspectors of the receiving and delivering roads. In the first and second systems the joint inspector issues all defect and transfer cards. In the third he issues only cards covering such defects on cars transferred as are in dispute, and which he is called upon to arbitrate.

The roads entering Memphis have a system similar to the last named, and it works well, but the joint car inspector is employed by the Superintendents' Association. It would be better to have this appointment made by the heads of car departments. The discussion which followed developed a strong sentiment in favor of adhering to the M. C. B. rules for all interchange work, and of having the appointment of the joint inspector placed in the hands of the mechanical departments. The third system as described by Mr. Casey was generally approved.

The next meeting will be held at Atlanta, Jan. 15, 1891, when Mr. A. G. Steinbrenner will present a paper on "Rigid and Swing Motion Trucks." Mr. P. Leeds will prepare a paper on the "Relative Merits of Brakes hung to the Car Body and of those hung to the Truck."

Technical Society of the Pacific Coast.

A regular meeting of the Technical Society of the Pacific Coast was held on Friday, Dec. 5, at the rooms of the society, No. 408 California street, San Francisco, Cal. Mr. Adolph Lietz read a paper entitled, "How to Tell a Good Surveying Instrument."

The Master Car Builders' Association.

The following circular of inquiry has been issued by the Committee on Air Brake Standards and Instructions:

How many freight equipment cars have you equipped with M. C. B. standard air brake details, *practically* like those shown in Plate X., proceedings 1890?

How many of the same cars are equipped with iron brake beams?

How many freight equipment cars have you equipped with iron brake beams, and with brake details different from those above mentioned?

Do you think that good results can be had and maintained by any form of wooden brake beam with modern air brake equipment, or do you consider that iron brake beams are necessary for good results and economy?

Representative members are requested to reply to above questions to John S. Lentz, Chairman of Committee, at Packerton, Pa., before Jan. 1, 1891.

PERSONAL.

—Mr. S. C. Smith, Superintendent of Motive Power of the Rio Grande Western, has resigned the position.

—Mr. Samuel H. Ayers, Auditor of the Wheeling & Lake Erie, died at Denver, Colo., last week, after an illness extending over several months.

—Mr. A. Bridgman, Jr., for many years General Manager and Secretary of the Keokuk & Des Moines road, died at his home in Keokuk, Ia., on Dec. 1.

—Mr. George W. Andrews, Southern Passenger Agent of the Chicago, St. Paul & Kansas City road at Chicago, will sever his connection with the company on Jan. 1.

—Mr. P. M. Butler, for many years Roadmaster of the Second Division of the Boston & Albany, died at his home in West Brookfield, Mass., Dec. 4, at the age of 58.

—Mr. W. R. Lehman, an engineer in charge of a Union Pacific surveying party, was drowned at Seattle, Wash., on Monday of last week, by the capsizing of a boat.

—Mr. Clifford P. Kennedy, Southern Passenger Agent of the Milwaukee, Lake Shore & Western at Cincinnati, O., has resigned to accept a position with another company.

—Mr. Henry Fink, who was recently elected Vice-President of the Cincinnati Southern and the Alabama Great Southern, announces his intention of resigning the office very soon.

—Mr. Frank W. Parsons has resigned as General Freight Agent of the Rome, Watertown & Ogdensburg Railroad, and has accepted an appointment as traveling Freight Agent of the Northern Central.

—General George J. Magee, who built the Beech Creek road and has been its General Manager from the beginning, has resigned, and Mr. J. D. Layng, General Manager of the West Shore road, has been appointed to succeed him.

—Mr. Adin Thayer, ex-Canal Commissioner of the State of New York, at one time Purchasing Agent of the New York Central Railroad, and for 25 years Financial Manager of the Walter A. Wood Mower & Reaper Co., died at Akron, O., this week, aged 74 years.

—Mr. William F. Turreff, formerly Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis road, has been appointed Master Mechanic of the Chicago & Erie, to succeed Mr. H. P. Latta, whose resignation has already been announced.

—Mr. Edwin H. Warner has resigned his position of Principal Assistant Engineer on the Seattle, Lake Shore & Eastern. Mr. Warner has been employed on the line since April, 1888, and will open an office in Seattle, Wash., with his brother, Joseph L. Warner, as civil and mining engineers.

—Mr. Moores Merrick White, a pioneer among builders of iron bridges in this country, died recently at his residence in New York City. He was born at Spencer, Mass., 81 years ago, and for a time was a merchant at Syracuse. He removed to New York in 1840 and began building bridges, one of the earliest of which was the old Buffalo Creek bridge.

—Mr. S. B. Opdyke, Jr., General Superintendent of the Central New England & Western, has resigned that position, and will shortly engage in other business. He was appointed to the office in January a year ago. He had previously been connected with the New York, New Haven & Hartford as Assistant Engineer and Engineer of Bridges, and before that was Engineer of Maintenance of Way and General Superintendent of the New Haven & Northampton.

—Mr. Robert B. Cable, Superintendent of the main line division of the Philadelphia & Reading, has been appointed General Manager of the Jacksonville, Tampa & Key West systems. Mr. Cable was in the service of the Erie road between 1863 and 1883, for six years as Superintendent of the Susquehanna division. He was General Superintendent of the Denver & Rio Grande for a year, until appointed Superintendent of the main line division of the Reading.

—Mr. E. G. Allen, formerly Superintendent of the Shore Line division of the New York, New Haven & Hartford, has been appointed Superintendent of the Central division of the Old Colony. Mr. Allen resigned from the New York, New Haven & Hartford to become Superintendent of the Hudson River division of the New York Central & Hudson River road, which had just been divided off from the Mohawk division, but he resigned within a few months of his appointment.

—Mr. Andrew J. Cassatt, member of the Inter-Continental Railway Commission as a delegate from the United States, was elected President of the body at its first meeting last week. He is President of the New York, Philadelphia & Norfolk, but he is chiefly known to railroad men through his long connection with the Pennsylvania, of which he has been Superintendent of Motive Power, General Superintendent, General Manager and Third and First Vice-President. He resigned the latter office in 1883.

—Mr. Charles H. Nye, who has been Superintendent of the Cape Cod division of the Old Colony road since 1872, has resigned his position and Mr. James H. French has been transferred to the division. Mr. French has been Superintendent of the Central or main line division since 1883, and has been connected with the Old Colony road since he was 14 years old, or for the last 16 years. He is a member of the Superintendents' and other railroad associations, and is widely known among railroad men.

—Mr. S. H. H. Clark, First Vice-President and General Manager of the Missouri Pacific, was this week appointed General Manager of the Union Pacific, in addition to his present duties. He will also be elected Vice-President. Mr. Clark was formerly General Manager of the Union Pacific, but resigned soon after the election of Mr. C. F. Adams to the Presidency. Mr. William H. Holcomb, who has been Vice-President of the Union Pacific since November, 1888, will be the chief executive officer resident at Omaha under Mr. Clark.

—Mr. Harvey S. De Pew, Traffic Manager of the Mobile & Ohio, died at St. Louis, Dec. 8, of heart disease. He had been Traffic Manager of the road for four years, and had been previously General Agent of the East Bound Traffic at St. Louis from Sept. 1, 1883. Mr. De Pew was born in Connecticut, and he was for a time in 1856 Assistant Yardmaster of the Erie yards at Hornellsville, N. Y. He became ticket agent of the Illinois Central in 1857, and Agent of that road and the Ohio & Mississippi at Odin, Ill., in 1860. Ten years later he was appointed General Freight and Passenger Agent of the St. Louis, Alton & Terre Haute.

—Mr. Charles F. Berwind, President of the Berwind-White Coal Mining Co., probably the largest coal firm in the country, died Dec. 4, in Philadelphia, of Bright's disease of the kidneys, in the forty-fifth year of his age. He was born in Philadelphia April 1, 1846, and educated in the public schools. He had been connected with the coal trade at Philadelphia all his business life, and was one of the first to begin the development of the Clearfield coal region in Pennsylvania. Mr. Berwind was interested in many enterprises. He was President of the Pennsylvania & Northwestern Railroad, a Director in the Sunbury & Lewistown Railroad, in the Girard Life Insurance, Annuity & Trust Co., in the Girard National Bank of Philadelphia and in other large institutions.

—Mr. Thomas J. Whitman, of St. Louis, a very widely known engineer, died suddenly, last week, of typhoid pneumonia. Mr. Whitman was born in Brooklyn, N. Y., in 1833. He was a half brother of Walt Whitman, the poet. He was appointed chief engineer of the water-works of St. Louis in 1867, and during the ten years he held the office the present water-works, including the Compton Hill reservoir, were constructed. In 1877 he was chosen Water Commissioner. This position he held until 1887, since which time he has been in business as a consulting engineer. He was known in connection with the Milwaukee drainage system, and his last work was upon the Memphis water-works. He held the office of Vice-President of the Society of Mechanical Engineers at the time of his death, and was Vice-President of the American Society of Civil Engineers in 1885.

—Mr. Walter S. Chisholm, of Savannah, died at the Victoria Hotel, in New York, Dec. 5, where he had lived for the last 10 years. He was born in Savannah, Ga., in 1836. For years he was prominent in legal circles, and was at one time Judge of the Superior Court of Chatham County, Ga. He was counsel for the Atlantic & Gulf road, and when the latter was reorganized under the name of the Savannah, Florida & Western he became its Vice-President. At the time of his death Judge Chisholm was also Vice-President of the Plant Investment Co., and of the Southern Express Co. A few months ago he was elected President of the Alabama Midland. He was the legal adviser of all these corporations, being besides a director of the Richmond & West Point Terminal Co., the East Tennessee, Virginia & Georgia and the Central of Georgia. The remains were taken by special train to Savannah, where the funeral was held.

—Mr. Alfred L. Dennis, President of the United Railroads of New Jersey, died Dec. 8 at the advanced age of 73 years, at his residence, in Newark, N. J. Mr. Dennis was born in Newton, N. J., in 1817, and was descended from Quaker ancestors who settled in Bucks County, Pa. His first experience in railroad affairs was as a Director of the Naugatuck Railroad of Connecticut. He was the Vice-President of that road in 1859. In 1861 he was elected a Director of the New Jersey Railroad & Transportation Co., and became President in 1864. This line, together with the Camden & Amboy Railroad and several other transportation companies, were leased to the Pennsylvania Railroad Co. in 1871, and became known as the United Railroads of New Jersey Division of the Pennsylvania system. Besides being President of the United Railroads of New Jersey Mr. Dennis was either President or Director of nearly three dozen corporations. He was interested in various industrial and financial enterprises.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The Southern division of this company has been divided in two parts, the first to be known as the Panhandle division and the other to retain the name of Southern division. D. H. Rhodes has been appointed Superintendent of the former division, with headquarters at Wellington, Kan. The headquarters of the latter division will be removed from Wellington to Wichita, Kan.

Baltimore & Philadelphia.—The annual meeting of this division of the Baltimore & Ohio, held at Wilmington, Del., Dec. 9, resulted in the re-election of the following directors: Thomas M. King, J. B. Washington, William M. Canby, J. T. Odell, William Canby, Henry A. Du Pont, George de B. Keim, J. Van Smith and Theodore Frothingham. The old officers were re-elected as follows: President, Thomas M. King, Philadelphia; Vice-President and General Manager, J. T. Odell, Baltimore; Secretary, John C. Farra, Wilmington; Treasurer, W. H. Ijams, Baltimore; Auditor, W. T. Thelin, Baltimore.

Beech Creek.—J. D. Layng has this day been appointed General Manager of this company in place of Gen. George J. Magee, resigned. Heads of departments will hereafter report to Mr. Layng accordingly.

Boston & Maine.—At the annual meeting of the company in Lawrence, Mass., Dec. 10, the directory was increased from 11 to 13, and the following directors were elected: Frank Jones and Amos Paul, of South Newmarket, N. H.; Joseph S. Ricker, of Deering, Me.; Samuel C. Lawrence, of Medford, Mass.; R. Olney, William T. Hart, Asa Potter, A. H. Sulloway, and David P. Kimball, of Boston; Charles A. Sinclair, of Portsmouth; John W. Sanborn, of Wakefield; Arthur Sewell, of Bath, Me., and James T. Furber. Charles A. Sinclair and John W. Sanborn succeed George C. Lord and W. S. Stevens, resigned, and Arthur Sewell and D. P. Kimball are new members.

Canadian Pacific.—The following changes have been made: C. E. McPherson, formerly District Passenger Agent in Boston, Mass., has been appointed Assistant General Passenger Agent in charge of the freight and passenger business of the company's New Brunswick division, with headquarters at St. Johns, N. B. H. J. Colvin, formerly City Passenger Agent at Boston, Mass., has been appointed New England Passenger Agent, with headquarters at the same place. G. A. Titcomb has been appointed to succeed Mr. Colvin.

Chicago & Erie.—William F. Turreff has been appointed Master Mechanic at Huntington, Ind., vice H. P. Latta, resigned.

Chicago, Milwaukee & St. Paul.—W. N. Winne has been elected General Auditor of the company, with headquarters at Chicago, vice James Whaling, resigned.

Cleveland, Cincinnati, Chicago & St. Louis.—The following Engineers of Maintenance of Way have been appointed: T. O. Morris, in charge of Chicago, St. Louis and Whitewater divisions, with office at Indianapolis; George W. Kittredge, in charge of the Cleveland, Cincinnati and Indianapolis divisions, with office at Indianapolis; W. A. McConnell, in charge of the Peoria division, with office at Indianapolis; F. S. Balcom, in charge of the Cairo division, with office at Mt. Carmel, Ill.; F. Woodbridge, in charge of the Sandusky division, with office at Sandusky, O. Clarence E. Irwin, who has been Chief Clerk in the Chief Engineer's office at Cleveland, has been appointed Chief Clerk of Maintenance of Way, with office at Indianapolis. The office of Chief Engineer of Maintenance of Way has been abolished.

Colorado Midland.—The following constitute the new board of directors of this company: Allen Manvel, Chicago; Thomas Baring, George C. Magoun, E. H. Abbott, and B. P. Cheney, Boston, Mass.; Cecil Baring, John J. McCook, William Libbey, Joseph R. Busk and Thomas E. Jevons, New York City, and J. J. Hagerman, Colorado Springs, Col. Allen Manvell is President of the road,

and Joseph R. Busk is Chairman of the Board of Directors.

Delaware & Otsego.—The following were elected directors at the annual meeting this week; S. W. Andrews, Charles Bray, G. D. B. Hasbrouck, J. H. Thompson, Charles Reynolds, Wm. B. Peters, James S. Kerr, M. S. Roberts, H. C. Soop, Henry Davie, S. G. Dimmick, Albert Morris, and George I. Wilbur.

Duluth Terminal.—The company held its annual meeting recently and selected W. P. Clough to fill the vacancy in the board of Directors caused by the death of H. D. Minot. W. C. Farrington was re-elected Vice-President and General Manager, and D. G. Cash, Secretary and Treasurer.

Eastern (Massachusetts).—At the annual meeting of the stockholders of the road in Boston, Dec. 10, the number of Directors was reduced to five, and the following were elected: Frank Jones, Samuel C. Lawrence, James T. Furber, Asa P. Potter and Charles A. Sinclair.

Fort Worth & Denver City.—The old board of di rectors was re-elected at the annual meeting held at Fort Worth, Tex., Dec. 9.

Hartford & Connecticut Valley.—The company held its annual meeting at New Haven, Conn., Dec. 9, and elected officers as follows: President, Henry C. Robinson, Hartford; Secretary, William C. Brainard, New Haven; Treasurer, William L. Squire, New Haven; Division Superintendent, J. V. A. Trumbull. These directors were elected: H. C. Robinson, Samuel Babcock, William D. Bishop, E. M. Reed, D. C. Spencer, Nathaniel Wheeler, E. H. Trowbridge and Charles P. Clark.

Illinois Central.—J. G. Hartigan has been appointed Superintendent of the Northern lines of the company to succeed E. G. Russell, who has been transferred to the Wisconsin division. J. W. Seymour has been appointed Division Superintendent of the Cairo division, with headquarters at Chicago, to succeed J. G. Hartigan, transferred. G. W. Hatter has been appointed Assistant Division Superintendent of the Chicago division, with headquarters at Cairo. D. S. Bailey has been appointed Superintendent of the Springfield division, with headquarters at Springfield, vice William Wilkinson.

Knox & Lincoln.—The following directors were elected at the last annual meeting at Bath, Me.: John T. Berry, John S. Case and A. F. Crocket, Rockland; William E. Vinal, Thomaston; Edwin O. Clark, Waldoboro; D. W. Chapman, Damariscotta; Ebenezer Haggett, Newcastle; Henry Ingalls, Wiscasset; John G. Richardson, John R. Kelley and James W. Wakefield, Bath.

Louisville & Nashville.—Capt. J. M. Falkner has been appointed Chief Attorney for the company in Alabama, to succeed the Hon. Thomas G. Jones. Col. Charles P. Jones has been appointed Assistant Attorney.

Marietta & North Georgia.—The following directors and officers were elected at a recent meeting of stockholders: Directors, Lennox Smith, of New York; J. G. Whitecomb, of Murphy, N. C.; H. M. Hammeet, Marietta, Ga.; J. B. Glover, Marietta, Ga.; A. L. Hartridge, Savannah, Ga.; H. M. Aiken, Knoxville, Tenn.; W. B. Bradley, Knoxville; M. R. Gray, Knoxville, and L. H. Baker, Bridgeport, Conn. Officers, Lennox Smith, of New York, Vice-President; H. M. Hammeet, of Marietta, Ga., Secretary, and Col. J. B. Glover, of Marietta, Treasurer.

Milwaukee, Lake Shore & Western.—Ernest Vliet, General Passenger Agent of the road, has recovered his health sufficiently to resume his official duties from which he was relieved last June.

Montgomery, Hayneville & Camden.—The incorporators of this Alabama company are: W. F. Vandiver, Jacob Griel A. A. Wiley, John W. Durr, J. N. Gilmer, John T. Milner, Chas. M. Shelby, Willis Brewer, A. E. Chaffee, John P. Streety, L. E. Starr, R. E. McWilliams and Sol D. Bloch.

Natchez, Jackson & Columbus.—At the annual meeting of the company at Natchez, Miss., recently, Maj. Lawrence was elected a member of the board of directors to succeed Capt Rockwell, deceased. A. M. Cook was elected President, vice T. J. Nicholls, resigned, and Maj. J. M. Edwards was elected Vice-President.

New York, Lake Erie & Western.—The offices of the Susquehanna division have been removed from Susquehanna, Pa., to Elmira, N. Y., and 25 employés have been assigned to that point.

New York, Providence & Boston.—At the annual meeting in Providence, R. I., Dec. 10, the following Directors were elected: Samuel D. Babcock, George M. Miller, Nathan F. Dixon, Robert Knight, Henry C. Robinson, George Peabody Wetmore, John L. Riker, Benjamin N. Lapham, J. Walter Wood, J. Pierpont Morgan and Geo. G. Haven.

Old Colony.—At a meeting of the directors of the road held in Boston recently, the resignation of C. H. Nye as Superintendent of the Cape Cod Division was finally accepted. To fill the vacancy J. H. French, who has heretofore been Superintendent of the main line, was transferred to that division. E. G. Allen, who has been Superintendent of the Shore Line Division of the New York, New Haven & Hartford Railroad, was chosen to fill the position made vacant by the transfer of Mr. French.

Omaha, Kansas Central & Galveston.—The directors of the company, the charter for which was filed under the laws of Kansas on Nov. 21, met in Chicago, Dec. 5, and elected officers as follows: President, Jacob Newberger, of New York; Vice-President, C. M. Rawlings, of Alliance, Kan.; Treasurer, D. W. Bell, of Alliance; Secretary, Valdemar Sillo, of New York; Chief Engineer, Edward Roemer, of New York. The offices of the President and Secretary are to be in New York, while the headquarters of the other departments will be in Alliance, Kan.

Oregon Improvement Co.—The general offices of the company are to be removed from New York City to Portland, Oregon.

Paducah, Tennessee & Alabama.—The annual election of directors resulted as follows: T. H. Puryear and Charles Reed, Paducah; J. W. Trisloe, J. W. Phillips and E. Cunningham, St. Louis; A. B. Lamb, J. L. Booth and J. J. Head, Paris, Tenn., and L. C. Linn, Murray, Ky. The directors elected T. H. Puryear, President, J. W. Phillips, Vice-President, and J. W. Trisloe, Secretary.

Pennsylvania.—W. H. Hipple has been appointed Chief Inspector of Bridge and Track Material, vice A. Gilpin, resigned.

Pensacola & Atlantic.—At the annual meeting of the stockholders at Pensacola, Fla., the old board of directors was re-elected, as follows: M. H. Smith, A. M. Quarrier, C. Quarrier, W. A. Blount and W. F. McCormick. The former officers were re-elected, as follows: M. H. Smith, President; W. D. Chipley, Vice-President; J. H. Ellis, Secretary, and W. W. Thompson, Treasurer.

Portland & Rochester.—George P. Westcott, Nathan Webb, William L. Putnam, Charles McCarthy, Jr., Portland; George C. Lord, Newton, Mass.; Stephen J. Young, Brunswick; Joseph S. Ricker, Deering; Arthur Sewall, Bath; James T. Furber, Lawrence, Mass., were elected as directors at the annual meeting recently held at Portland, Me.

Richmond & West Point Terminal.—At a meeting of the stockholders of the company held in Richmond, Va., Dec. 9, the changes in the control of the Richmond Terminal Company, foreshadowed for some time, were formally made. The following new members entered the board of direction: Jay Gould, George J. Gould, Sidney Dillon, Henry B. Plant, Abram S. Hewitt, R. T. Wilson and J. C. Mabin.

Rome, Watertown & Ogdensburg.—F. W. Parsons' resignation as General Freight Agent having been accepted, until further notice correspondence relative to local freight traffic should be addressed to Delos E. Thomas, Chief Clerk, General Freight Department, Oswego, N. Y. All correspondence relative to through traffic, also coal, coke, ore and oil traffic, should be addressed to L. A. Emerson, General Traffic Manager, 96 Broadway, New York City.

St. Paul & Duluth.—Leverett S. Miller, who in October was appointed Chief Engineer of the St. Paul & Duluth, has received the additional appointment of Assistant General Manager. His office is at Duluth, Minn.

San Domingo Central.—At the meeting of the directors of the company in New York last week the following officers were elected: Gen. Horatio C. King, President; H. L. Bean, First Vice-President and Secretary; G. G. Ward, Second Vice-President; P. P. Harris, Treasurer; W. H. Bibby, Malcolm Griswold and A. L. Fowler, Executive Committee, and H. L. Bean, G. G. Ward, W. H. Bibby, P. P. Harris and M. Griswold, Finance Committee.

Sea View (Elevated).—At the annual meeting of the company the following directors were re-elected for the ensuing year: I. M. Bon, Felix Campbell, Joseph Fahys, James Jourdan, Jesse Johnson, A. R. Johnson, E. L. Langford, H. C. Mangles, Alonzo Slote, F. A. Schrœder, D. H. Valentine and H. Von Deilen, Brooklyn, N. Y., and J. L. Morrow, Flatbush, N. Y. These officers were re-elected: President, F. A. Schrœder; Treasurer, I. M. Bon, Secretary and Superintendent, J. L. Morrow.

Ulster & Delaware.—At the annual meeting of the stock and income holders of the company held in Rondout, N. Y., Dec. 10, the following directors were elected: Edward Young, Robert C. Pruyn, Horace G. Young, A. Van Santvoord, J. D. Layng, William A. Read, C. C. Clark, Joseph Cornell, H. C. Soop, Davis Winne, T. C. Hoornbeck, S. G. Dimmick, and A. S. Staples.

Union Pacific.—The following changes have been made: G. B. Cliff, Trainmaster at Ogden, Utah, has been appointed Chief Dispatcher at Patatello, Idaho, and C. B. Griffin becomes Trainmaster at Ogden.

Wilmington, Onslow & East Carolina.—J. W. Martenis, formerly Auditor of the Rochester and Pittsburgh Coal & Iron Co., has accepted the position of Traffic Manager and Auditor of this new road, which is now under construction.

Wood River Branch —The old board of directors, consisting of Amos C. Nichols, Edward Barber, George H. Olney, John L. Kenyon, Wm. F. Joslin, Charles S. Nichols, Anson Greene, Jeremiah B. Gardiner and Benjamin F. Langworthy, was re-elected at the annual meeting held at Hope Valley, R. I., recently. The directors held a meeting and elected A. C. Nichols, President and G. H. Olney, Treasurer and Secretary.

York Harbor & Beach.—The annual meeting of the stockholders was held at York, N. H., last week, when the following directors were chosen: Frank Jones and J. S. Ricker, Portsmouth, N. H.; G. C. Lord, Newton, Mass.; S. O. Lawrence, Medford; J. F. Staples, S. S. Marshall and H. E. Evans, York. The directors elected Frank Jones President, S. W. Jenkins, Clerk, and Amos Blanchard, Treasurer.

RAILROAD CONSTRUCTION,

Incorporations, Surveys, Etc.

Akron & Chicago Junction.—About 60 miles of the road has been completed, and as good weather has prevailed recently it is thought that the other 13 miles will be finished within the next two months. This road is owned by the Baltimore & Ohio and will give the latter a short route from Pittsburgh to Cleveland in connection with the Pittsburgh & Western.

Arkansas & Gulf.—The survey of this road has been completed from Arkansas City, via Lake Village to the Louisiana State line. William Bonner is secretary of the company.

Atlanta & Chattahoochee River.—A bill has been introduced in the Georgia Legislature to charter this company and it is expected that it will be passed in a very short time. The company is now engaged in securing the right of way for a line from Atlanta to the Chattahoochee River via Hollywood Cemetery and back to the City of Atlanta. The entire road will be about 15 miles long.

Baltimore & Eastern Shore.—The old Wicomico & Pocomoke division is being entirely reconstructed, the grade reduced, and ties, rails and bridges renewed. It is expected to have the work completed about Feb. 1. This division extends from Salisbury to Ocean City, on Synepuxent Bay and the Atlantic Coast, 31 miles. The balance of the road was opened Nov. 19 last. The main line east of Chesapeake Bay is from Claiborne to Salisbury, 57 miles, and Ocean City, 87 miles. The transfer across Chesapeake Bay is by steamer to Bay Ridge, connecting at Bay Ridge with the Annapolis & Baltimore Short Line for Baltimore, and through passenger trains are run into and out of the Camden Street Station of the Baltimore & Ohio twice a day each way. The entire length of road when completed will be 104 miles, divided as follows: West Annapolis to Bay Ridge, five miles; Bay Ridge to Claiborne, 12 miles; Claiborne to Ocean City, 87 miles. The Annapolis & Baltimore Short Line operates the five miles from West Annapolis to Bay Ridge at present. The principal towns reached are: Bay Ridge, Claiborne, St. Michaels, Easton, Preston, Hurlock, Vienna, Barren Creek, Salisbury, Pittsville, Berlin, and Ocean City, Md. The equipment of the road is four new locomotives, one old locomotive, three new passenger cars, two new combination cars, 10 new excursion cars, 15 second class cars, 50 box and 30 gondola cars. Arrangements are being made to purchase two new locomotives. New station houses, watering stations, etc., are being erected on the entire road.

Birmingham, Sheffield & Tennessee River.—The extension from Riverton, near the Tennessee River, to Margerum, Ala., on the Memphis & Charleston, was completed last week, and passenger trains will probably begin running this or next week. The extension is about 11 miles long.

Chattanooga Union.—Grading has been commenced for a cable incline on the west side of Chattanooga, Tenn., which will be built on the same principle and will be very similar to the Chattanooga & Lookout Mountain incline. It will probably be completed soon after Jan. 1. T. W. Rawlston, of Ridgedale, Tenn., has the contract for the grading.

Chesapeake & Ohio.—Ground has been broken on the extension from a point north of Clifton Forge, Va., at Millboro, through Bath County to Warm Springs and Healing Springs. The contractors expect to have the grading finished in about a month, and the extension will be ready then for track laying. The present line under contract is about 20 miles long, but it is probable that a further extension will be built to Covington on the main line.

The company has abandoned all idea of building the proposed road from Charlottesville, Va., north to Washington, D. C., for which a special charter was obtained during the last session of the Virginia legislature. A contract is now about concluded with the Virginia Midland, by which the company will have the right to use the tracks of that road from Gordonsville to Washington, about 90 miles.

The grading on the Craig Valley branch between Newcastle, the county seat of Craig county, and a point on the Chesapeake & Ohio, a short distance west of Buchanan, has been completed by the contractors, Howard & Sears, of Eagle Rock. The line is about 27 miles long.

Chicago, Danville & Ohio River.—The charter of this company was filed in Illinois last week. The capital stock is $20,000,000. The proposed road is to extend from Chicago southeasterly, connecting with the Chicago & Eastern Illinois at Cayuga, thence southeasterly to Paducah, Ky. The incorporators and first board of directors are: George W. Cole, C. P. Johnson, W. C. Collins, Roy O. West, and C. H. Willette, all of Chicago.

Clear Lake & Northern Pacific.—The company has been incorporated in California. The road is to extend from Lakeport to Hopland, in Mendocino County, a distance of 35 miles. There will be two branches to the road, one from a point in Big Valley to Soda Bay, and the other running to the main line of the San Francisco & Northern Pacific. The principal place of business of the company will be at Lakeport, and the capital stock $250,000. The directors are: Marshall Arnold, of Lakeport; F. H. Long, of Glen Alpine Springs, Lake County; W. T. Wheatly, P. G. Galpin and W. G. Zeigler, of San Francisco.

Columbia & Kootenai River.—The track on this branch of the Canadian Pacific has reached a point about four miles from the crossing of the Kootenai River and nine miles from Nelson, British Columbia. H. F. Keefer & Co., of Vancouver, who had the contract for the first 14 miles, have completed that work and have commenced to clear the right of way on another section south of their former contract. It is probable that they will continue the work throughout the winter, as it is largely rock cutting. The bridges will not be finished until February, and then warehouses and docks will be built at Nelson. Probably about 450 men will be employed through the winter. The line will be 28 miles long, extending from a point on the Canadian Pacific at Sproats, B. C., near the crossing of the Columbia and Kootenai Rivers, south to Nelson, B. C.

Columbus, Shawnee & Hocking.—The belt line which is being built by this company at Zanesville, O., to connect its line with that of the Cleveland & Canton, has met with several delays and was not completed by Dec. 10 as expected. It will probably be ready for operation before Jan. 10.

Dakota, Wyoming & Missouri.—The surveys have been made for this road from Rapid City through the Black Hills to Hill City, S. D., a distance about 33 miles and it is expected that the contracts for building the road will be let about the first of next month. The grading will probably average a maximum of 50 ft. per mile. Bonds will be issued to complete the road, but no arrangements have been made to dispose of them, and that trifling fact may delay the work beyond the time stated. W. T. Coad, of Rapid City, is President.

Denver & Rio Grande.—The company has several parties of surveyors in the field on new lines. One party is camped between Leadville and Tennessee Pass, another party near Frisco, one below Dillon on the Blue, another near Montezuma, on the Snake River, another on the Argentine Pass or near it, and a party near the head of Bear Creek.

Duluth, Pierre & Black Hills.—It is expected that the contract for tracklaying on a large part of this road will be let during the coming winter and that construction work will be resumed early in the spring. The grading is finished between Aberdeen and Faulkton, S. D., a distance of about 44 miles. The surveys have been practically completed from Oakes, in Dickey County, N. D., through Brown, Edmunds, Faulk, Hyde, Sully and Hughes County to Pierre, a distance of about 182 miles. Until recently about 250 teams were at work south of Aberdeen. The work is of an easy character, the maximum grades being 40 ft. per mile, and the maximum curves four degrees. The largest pile bridge will be over the James River; it will be about 700 ft. long. All the other bridges are short pile and trestle structures. James A. Ward is General Manager and B. P. Tilden is Chief Engineer. The office of both is at Aberdeen.

Duluth & Winnipeg.—A party of right-of-way men has started for the Northern Indian reservations to complete right-of-way settlements for that line in Minnesota. Each reservation, including Red Lake, Leech Lake and Winnebagoshish, has to be visited, where Indians are assembling in council for that purpose. The party goes on via Detroit and White Earth.

Findlay Belt.—New articles of incorporation will soon be filed in Ohio for this road which is to be built as a belt line at Findlay, O., connecting with the tracks of all the roads now entering the town. The right of way has been secured by the present company, but its charter expires in January. The bonds of the company will be endorsed by the roads whose tracks will be connected.

Fort Lee, Leonia & Hackensack.—A survey is being made this week preparatory to beginning work on the Fort Lee, Leonia & Hackensack road, all the money necessary for the construction of the road having been subscribed.

Georgia.—A bill has been introduced in the legislature chartering the North Georgia Railroad Co.

Great Northern.—Shepard, Siems & Co., American Bank Building, St. Paul, Minn., are prepared to receive bids for a large amount of work west of the summit of the Rocky Mountains on the line of the road, including grading, which consists of rock, earthwork and tunneling; also a large amount of hewed timber for structures. The work is located, and the supplies for carrying it on are on the ground, and the work is ready to commence at once.

Great Salt Lake & Hot Springs.—S. Bamberger and others of Salt Lake City recently organized this company, and articles of incorporation will soon be filed. The road is to extend from some point in the north part of Salt Lake City, thence through the counties of Salt Lake and Davis to a point near Farmington, and also from a point on the road described westward to a point near the Jordan River. The total length of this road will be about 20 miles and it is to be operated by steam dummies. The capital stock is placed at $200,000.

Greenville, Nashville & Chattanooga.—The Southern Construction Co. has contract for building the road from Corinth, Miss., to the Tennessee River, 20 miles.

Gunpowder Valley.—Frederick & Zeigler, of Alesia, Md., have the contract for building this road between Hoffman and Rockdale, Md., a distance of five miles. G. W. S. Hoffman, 11 South Gay street, Baltimore, is President.

Greenwood, Edgefield & Atlanta.—This company has applied to the Georgia state legislature for a charter to build a road from Greenwood north to Greenville, S. C., and also easterly to a point on the Atlantic coast at Charleston or Port Royal.

Houston Belt.—The locating survey which was recently begun at Houston, Tex., has been completed for about six miles and the contracts for grading will probably be let before Dec. 20. Several bids on the work have already been made.

Houston & Texas Central.—Right of way is being secured for a second track through the city of Houston, Tex., and it is stated that if the work is carried outa new passenger station will also be built.

Huntington & Big Sandy.—The greater part of the grading is now ready for the ties and rails, and tracklaying will begin on the road next week. The bridge across Four Pole Creek is now being built, and will be completed before all the track is laid. The company expects to have trains running by Feb. 1.

Macon & Birmingham.—The grading has been about completed through La Grange, Ga., and the tracklaying is going on very rapidly. The new station will be built by the Atlanta & West Point and Macon & Birmingham jointly.

Manchester & Augusta.—At a recent meeting of stockholders the board of directors was authorized to build the road from end of track to Augusta, Ga., as soon as practicable. This line will be the Atlantic Coast Line extension.

Missouri, Kansas & Texas.—The Sherman, Dennison & Dallas is now being operated by this company between Dennison and Sherman. It was understood that the line would not be built beyond the latter point, but it is now reported that a considerable force is pushing the construction south toward Dallas. There are no towns between the two points, and it is not likely that the extension will be built to Dallas.

Montgomery, Hayneville & Camden.—A bill has been introduced in the Alabama Legislature to incorporate this company. The proposed road is to extend through the counties of Montgomery, Lowndes and Wilcox, from the city of Montgomery, via Hayneville to Camden in Wilcox County. The bill fixes the capital stock at $500,000.

Mexican International.—The company has recently placed in operation a branch which extends from Harnos, near Torreon, the southern terminus of the main line, northerly to San Pedro, in the state of Coahuila, Mex., a distance of about 14½ miles. The branch was built by William T. Robertson, of Eagle Pass, Tex.

Middle Georgia & Atlantic.—On the Social Circle branch the grading has been completed from the junction with the main line near Newbern north to Harris Spring Church, a few miles south of Social Circle. Nearly all the track has been laid on the line between Machen and Eatonton, Ga., and tracklaying is in progress on the line from Machen to Covington. These lines will be 45 miles long. Extensions are proposed from Eatonton to Atlanta, 21 miles, and from Eatonton to Savannah. Of this latter line the first 60 miles to Riddleville has been located.

New Roads.—J. H. Bennett has been awarded the contract to grade a road from Aransas Pass, Tex., to Harbor Island, which is to be built by the Aransas Harbor City & Improvement Co. It will be a double track line about 10 miles long, extending from Aransas Pass on the mainland near Rockport across the Bay and the Island to the Government Lighthouse, where docks are being built for the largest ocean ships.

A meeting of citizens was held recently at Brazoria, Tex., on the subject of a railroad between Houston and the mouth of the Brazoria, a distance of 55 miles, and it was estimated that the people of that county would give 20,000 acres of land to advance the project, which, estimated at $10 per acre, would be $200,000, half the cost of building the road, based upon estimates made after a survey. Harris County will probably give as much.

The Southern Iron & Timber Co. has decided to build a railroad from the top of the English Mountain, at the county line between Cooke and Sevier counties, Tenn., via Carson Springs and the manganese mines and down Sinking Creek to a point one and a half miles west of Newport, thence east to Newport and from Newport up he Pigeon River to the state line between North Carona and Tennessee.

The East Tennessee Mining & Improvement Co., of Watauga, Tenn., formerly Carter's Station, has commenced the construction of a railroad from that place to the East Tennessee & Western North Carolina road at Watauga point, a station near the mouth of Buffalo Creek. The distance is about four miles, and one mile is already graded. Some of the work is very heavy, and the force is kept at work night and day.

New York Central & Hudson River.—One of the officers states that it is proposed to begin the construction of the extension to the Thousand Islands, as soon as the route is selected. The surveys now being made are experimental, and the corps of nine men now in the field will determine the best route upon which to build branch lines from Utica to Watertown, Clayton, N. Y., Cape Vincent and other points on the St. Lawrence River. Several routes will be examined, and the intention is to proceed with construction upon the most promising route when selected at as early a day is practicable.

Norfolk & Western.—The first track on the West Virginia & Ironton extension was laid last Saturday in West Virginia and work will now be pushed rapidly through the state. The larger part of the grading through West Virginia has been graded. The line is 190 miles long, and the first 85 miles from Elkhorn, W. Va., is ready for tracklaying. The contractors have a large force on the remaining distance to the Ohio River at Ironton.

Northern Pacific.—The extension to Farmington, Wash., is completed and ready for traffic. Farmington is seven miles from Belmont, on the Spokane & Palouse branch.

Old Colony.—The second track extension which has long been contemplated on the Providence division on the Dedham branch, between Readville and Dedham, Mass., has been commenced. About 40 men are engaged in blasting out the roadbed, making culverts and filling in. With open weather the work will be finished by early spring, as a portion of the track has been laid. This will, when completed, make a belt line on the Providence division for a distance of 10 miles from Boston.

Oregon & Washington Territory.—On the line between Centralia and Gray's Harbor, Wash., the company has about 25 miles of the road-bed finished between Centralia and Elma, and ready for the ties and rails. Two sawmills, employing 150 men, are busy getting out ties, and that part of the road will probably be laid next month. The force on the grading has been reduced because so many men could not work to advantage with the weather and the ground as it is. As soon as the weather is settled again, however, there will be a larger force than ever put on. The heaviest part of the grading work is now finished, and by an arrangement with the Northern Pacific, the difficult passes near Porters Creek are used jointly.

Paducah, Tennessee & Alabama.—The engineers began surveys last week from Paris southeast to Hollowrock, Tenn., about 20 miles, and the survey will probably be continued from that point through Tennessee toward Florence, Ala., which is the proposed southern terminal of the road. It is thought that trains will be running from Paducah to Paris, Tenn., before Jan. 1. Trains are at present running as far as the Tennessee state line, about 14 miles north of Paris.

Pennsylvania.—The Trenton cut-off of the Pennsylvania Railroad is now all graded between Morrisville and Norristown, Pa., and the ties are being laid preparatory to tracklaying. The road will be opened next spring.

Penobscot Shore Line.—This company is understood to be willing to purchase the Bangor & Piscataquis, the controlling interest in which is held by the town of Bangor, Me. A local journal says that it is proposed to build from Bangor up the Kenduskeag valley, through Kenduskeag, Corinth and Charleston to Dover, to the Canadian Pacific connection at Greenville. If satisfactory terms can be made for the purchase of the Bangor & Piscataquis road, the 12 miles of track between Milo and Dover will be taken up, leaving another nearly direct line from Bangor to Brownville Junction on the Canadian Pacific, and to Katahdin Iron Works, with a branch to be built from Milo to Sebec.

Philadelphia & Reading Terminal.—The Law Committee of the City Councils in Philadelphia has decided to report favorably on the bill introduced last week granting the company the right to construct an elevated railroad through certain portions of the city, in order to extend its tracks to connect with the company's projected terminal station at Twelfth and Market streets. This is an amended bill, differing in several of its minor provisions from the first bill which was introduced about 18 months ago, and has never been reported on by the railroad committee, a majority of its members being opposed to it. The most important change in the new bill is that which provides for the elimination of several of the most important of the grade crossings, by carrying the road under or over the streets. When the new bill was introduced in councils last week, it was, in the face of some objection, referred to the Law Committee instead of to the Railroad Committee. President McLeod says in connection with the bill: I had several conferences with the officers of the Germantown & Norristown, which owns the present terminals at Ninth and Green streets, and the tracks leading to them, but I could not gain their consent to take up their tracks or even to build a road over them, and, as we are only lessees of the road, we could not do anything without their consent, so I had prepared the best bill I thought could be drawn. We do not ask the city or any one to contribute one cent toward carrying out our proposed bill. We will pay for everything. We build the bridges, do away with the grade crossings at Columbia avenue, Broad and Lehigh avenue, and Broad and Callowhill and Broad and Pennsylvania avenue, and all we ask is permission to build the road. We also do away with grade crossings at Green and Wallace streets. In his letter accompanying the ordinance offered to the city council President McLeod says that the plan goes to the utmost limit of the present ability of the company. The removal of the surface tracks on Pennsylvania avenue, west of Broad street, has been demanded, and there is strong pressure to postpone the whole improvement until these tracks can be discontinued, but it is shown that the damage to the numerous private sidings existing here would involve an enormous expenditure before any change could be made; and the present question is, practically, whether the construction of a new passenger line, simply, should be deferred because it is now impossible to carry out all the reforms desired. The plan now proposed will make no increase of grade crossings, and will hasten the abolition of some which it does not directly deal with.

Phillips & Rangeley.—The track has been laid to a point near Dead River, within five miles of Rangeley, Me. The rails have arrived at Phillips and will be put down very soon. Passenger trains are running to Redington, but as the line is not ballasted beyond that point, it will be the terminus of passenger trains this winter.

Reading & Southwestern.—An engineer corps commenced on Nov. 25 to locate the line, and it is expected that the road will be completed and in operation in six months. The company will build a bridge across the Schuylkill River at Reading. The line will extend from the business centre of Reading to Mohnsville, five miles southwest. The capital is $130,000, of which $80,000 has been already subscribed. Henry Ahrens is president and G. W. Keim is secretary and treasurer.

Roanoke & Southern.—The track of the road has been laid to Stoneville, N. C. The road will reach Martinsville, Va., by Christmas, as the bed is level and ready for the track as far as Smith's River, three miles from there, and the piers for the bridge are completed, and iron for the bridge on the ground.

Rockaway Valley.—This road is being extended from Peapack to Mendham, N. J., and will probably be completed as far as Mendham by Christmas, at least for use in the transportation of freight and coal. During the coming year it will be continued to Morristown.

Rock Island, St. Louis & Peoria.—Articles of incorporation have been filed in Illinois by this company, which proposes to build a line from Pekin to East St. Louis, Ill.

St. Louis & Hannibal.—The work of surveying the extension of the road from New London to a point on the present line, either Centralia or Mexico, has begun, and it is now thought certain that the line will be built soon. This extension will be about 40 miles long, and will traverse some fine agricultural country in Northeast Missouri, besides opening up the coal lands near Perry, Ralls County.

South Bound.—Moore & Springs, of Yorkville, S. C., are said to have received the contract for grading the road from near Blackville to Columbia, a distance of 55 miles, the work to be completed Aug. 1, 1891.

Several routes have been surveyed for an entrance to Columbia, S. C., and it is stated that the one decided upon crosses the Congaree River about half a mile below the Charlotte, Columbia & Augusta bridge, which is about a mile below the city, and extends across the country without passing over any valuable land. It then reaches a point near the junction by the route already indicated, and passes around the city, ending near the Charlotte, Columbia & Augusta. The terminal station will probably be located one block from the Charlotte, Columbia & Augusta station.

South Carolina Roads.—A bill has been introduced in the state legislature incorporating the Charleston & Sea Island Railroad.

Southern California.—Bright & Crandall, of San Bernardino, Cal., have the contract for the grading on a new line from San Bernardino easterly to Montone, Cal., a distance of 13 miles. The San Bernardino Valley division is at present in operation between these points, but the new line will be built on a new route through the valley and will not pass through Redlands. It is expected to have nine miles of the track laid this year to Cram's.

Southern Pacific.—Work is rapidly moving along on the extension of the San Joaquin division toward Armona, Cal. Twenty cars of rails and ties on an average are shipped to the front daily. It is expected to build half a mile per day.

Western New York & Pennsylvania.—A good deal of grading has been done for a second track between Olean and Hinsdale, N. Y., a distance of about seven miles, and the track will be laid in a few weeks.

Wheeling & Lake Erie.—The track on the branch from Portland south along the Ohio River to Martin's Ferry opposite Wheeling, W. Va., has been nearly all laid, and it is expected to have the last of it finished by Jan. 1, and to have trains running soon after that date. This will complete the line along the Ohio river from Steubenville. The distance between the two points is 26 miles, and at present the division between Steubenville and Portland about 14 miles, is in operation. The principal stations on this line are Warrenton, Rush Run, Brilliant, Mingo Junction and Steubenville.

Winona & Southwestern.—The line was completed to Stewartville, Minn., last week, and train service has been extended from Dover, 45 miles from Winona, to that point. This completes the contract of D. Galligan, but the other contractors between Stewartville and the Iowa State line are pushing work on their contracts, and expect to have the grading and tracklaying finished before the time specified in the contracts. The line is now under contract as far as Osage, Ia., about 120 miles from the Mississippi River.

Woonsocket & Pascoag.—The tracklaying was commenced near Woonsocket, on the New York, Providence & Boston, on Dec. 3, and has now been completed through Nasonville to within a few miles of Pascoag, which is the westerly terminus. The road is about 12 miles long and connects the Providence & Springfield division of the New York & New England and the Providence & Worcester division of the New York, Providence & Boston in the northern part of Rhode Island.

GENERAL RAILROAD NEWS.

Boston & Maine.—The annual meeting was held in Lawrence, Mass., this week, and the stockholders voted to accept the legislative acts empowering the directors to issue stock and to guarantee the bonds of the St. Johnsbury & Lake Champlain Railroad. They also voted to accept the lease of the Wilton Railroad.

Canadian Pacific.—The following statement gives the earnings and expenses for October and the 10 months: Gross earnings for October, 1890, $1,766,446; Jan. 1 to Oct. 30, 1890, $13,269,548; operating expenses for October, 1890, $940,043; Jan 1 to Oct. 30, 1890, $8,340,546; net profits for October, 1890, $826,403.38; Jan. 1 to Oct. 30, 1890, $4,929,001. In October, 1889, the net profits were $848,479, and from Jan. 1 to Oct. 31, 1889, there was a net profit of $4,853,041. The decrease in the net profits for October over the same period last year is $22,067, and from Jan. 1 to Oct. 31 there is an increase of $75,959.

Charleston, Cincinnati & Chicago.—Judge Smith, at Jonesboro, Tenn., has appointed Samuel Tate, of

Memphis, receiver of this road. It is said that the company owes about $800,000 to contractors and engineers. The Massachusetts & Southern Construction Co., which is building the road, goes into the hands of the receiver also. It is said the road owes McDonald, Shea & Co., of which Mr. Tate is a member, nearly $500,000.

Chesapeake & Nashville.—On a motion of the Mississippi Valley Construction Co., in a suit against the railroad company, Richard T. Wilson, of New York, and the Metropolitan Trust Co., of New York, Gen. John Echols was on Dec. 8 appointed by Judge Barr to be Receiver of the company. The road is 35 miles long, extending from Gallatin, Tenn., to Scottville, Ky.

Marietta & North Georgia.—At a recent meeting in Knoxville of the stockholders of the Knoxville Southern and Marietta & North Georgia railroads the two roads were formally consolidated into one system, with the main offices at Knoxville. The line thus formed is 236 miles long. The present charter of the road provides that the consolidated road shall be known under the name of the Marietta & North Georgia Railway Co., but this name will be changed by an act of the Legislature so as to include the terminal points in the name. Arrangements were made to pay in full the amounts due the contractors who built the Knoxville Southern road.

Richmond & West Point Terminal.—A statement of the operations of the company for the year ending June 30, 1890, as compared with the same period of last year, is given in the following table:

	1890.	1889.	Inc.
Gross earn.....	$41,361,095	$35,596,983	$5,764,112
Operating expen.....	28,228,191	23,897,471	4,330,720
Net earn.....	$13,132,903	$11,699,512	$1,433,391
Fixed charges.....	10,637,185	9,434,445	1,192,740
Surplus.....	$2,495,717	$2,265,067	$230,650

Average miles operated in 1890 were 8,312, against 7,817 in 1889. Net earnings per mile, $4,976, against $4,544 last year.

St. Louis, Alton & Springfield.—Judge Phillips, in the Sangamon (Ill.) Circuit Court, has issued orders allowing the Receiver to issue a receiver's certificate in the sum of $300,000, payable in one year, with six per cent. interest, to any of the outstanding obligations for salaries, wages, supplies, and materials accrued in the past six months, and for the purchase of new material, rolling stock and locomotives.

St. Louis, Arkansas & Texas.—F. N. Reed, Special Master, reported to the United States Circuit Court at Waco, Tex., on Tuesday the sale of the road made by him Oct. 23, and Judge McCormick has entered a decree confirming the sale when the agreed amount of $6,000,000 shall be paid in accordance with the terms of sale.

Shenandoah Valley.—A joint meeting of the Shenandoah Valley and of the Washington & Western railroads was held in Alexandria last week, when the two roads were consolidated and reorganized under the name of the Shenandoah Valley Railroad Company. Mr. F. J. Kimball was elected President. The committee which purchased the Shenandoah Valley road in Roanoke on Sept. 30 last then conveyed that road to the new company.

Union Pacific.—Mr. F. L. Ames, of Boston, a director of the company, made the following statement this week in regard to the floating debt of the company. It was fully explained in last year's report. It has been reduced the past year by $4,000,000, and is now about $11,500,000. We sold $7,100,000 collateral trust bonds issued against the Oregon Railway & Navigation stock, and could at one time have sold all the $13,000,000, but thought them worth more, so that on account of the Oregon Railway & Navigation stock purchased we now have $6,000,000 bonds unsold. We have besides $2,000,000 Oregon Railway & Navigation bonds for construction advances, and there has been invested in the Portland & Puget Sound road $1,000,000, and in new equipment $1,400,000, for which bonds have not been sold. We have also put a large amount of money into side tracks, new shops at Cheyenne and Denver, and the union passenger station and freight stations at Omaha. Mr. Gould knew all about the floating debt when he entered the directory. He has provided for the Jan. 1 requirements, which are less than $2,000,000. I do not know of any scheme for funding the Union Pacific debt. Had there been no change in ownership or management there would have been no talk of it. We can easily pay it when the railroad bond market revives. I believe the October earnings are the worst the Union Pacific will show for many months. November and December should show an improvement. The trustees for the eight per cent. consolidated mortgage bonds have canceled during this year $7,367,000, reducing the annual fixed charges by nearly $600,000, but only one-half of this reduction will show in this year's report. This leaves outstanding only $6,636,000 of these bonds, and at their maturity in September, 1893, the company will cancel the entire issue. The trustees of the land money have now a million of dollars in hand for investment in the bonds. Besides this, the trustees of the Kansas Pacific consolidated mortgage have another million of dollars on hand. They have canceled $261,000 bonds of this year, against $167,000 last year.

Zanesville, Wooster & Marion.—Attorneys for the Mercantile Trust Co. of New York filed a bill in equity for $3,500,000 in the United States Court at Columbus, O., Dec. 6. This company holds the first mortgage bonds of the road, and asks for a foreclosure on the ground that the semi-annual interest due in July last has not been paid. But one section of the road has been built, and is known as the Zanesville Belt.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 10, 1890.

The first fruits of the investigation just concluded by the Federal Grand Jury at the instance of the Interstate Commerce Commission are four indictments, one against Thomas Miller, General Freight Agent of the Chicago, Burlington & Quincy; one against John M. Johnson, General Freight Agent of the Chicago, Rock Island & Pacific; one against John M. Eagan, President of the Chicago, St. Paul & Kansas City, and one against J. H. Long, Traffic Manager of the Illinois Steel Co. Each indictment charges a violation of the Interstate Commerce law. The case on which Mr. Long was indicted grew out of the investigation of manipulations in rates on coke shipped over the Panhandle and Chicago & Alton roads, which have been fully reported in these columns. The case against Miller is based on the charge that the Burlington road carried grain for less than tariff rates, the rebates being paid to one O. D. Gallup as alleged compensation for services. Gallup turned the money over to the shippers. Johnson is charged with having given reduced rates to the firm of A. C. Davis & Co. Eagan is charged with knowledge of the fact that his road was favoring a grain firm in Des Moines in violation of the law. Bail has been given by each of the indicted officials, and the cases will come up in their regular order for trial. It is probable that one case may be selected and tried first and carried up for a final decision on the constitutionality of the Act, in case the decision of the lower courts is against the roads. The trials will probably not be commenced until the March term of court.

As intimated in my dispatch of last week, the Western Passenger Association has agreed upon an agreement for the division of business passing between Chicago and St. Paul and Minneapolis, local and through. The agreement provides that Chairmen Finley, of the Western Passenger Association, Midgley, of the Western Freight Association, and Donald, of the Central Traffic Association (passenger department), shall be an advisory board, and empowered "to direct such arrangements as will insure to each line in interest a proper share of the controllable competitive traffic" on and after Nov. 1, until the expiration of 90 days' notice given by one or more parties to the agreement; no notice to be given by any line before Feb. 1, proximo; complete statements of all business covered by the agreement to be furnished the board; rates to be mutually agreed upon and fixed from time to time through the machinery of the Association; rates when fixed to be maintained absolutely and without deviation, and the directions of the board as to the disposition of controllable traffic to be fully complied with. The agreement is now being passed around among the lines for signature.

The Western Freight Association is in session this week, as are also the Trans-Missouri and Central Traffic Associations. The most important subject for consideration by the Western Freight Association is the proposed rate of 18 cents on live hogs and packing house products between Kansas City and Chicago. After having decided last week to put in these rates, but to increase the St. Louis differential to 10 cents on live hogs, the executive officers decided to reconsider the vote and the matter was postponed to this meeting for decision. It appears that the Alton would now rather have the compromise basis of 22 cents on live hogs and packing house products adopted, but that it has a contract with Fowler & Co. which obliges it to make the 18-cent rate on hogs in consideration of receiving the shipments of the firm. In view of this fact the other lines decided that the only way to meet the situation was to make such a low rate to St. Louis from Kansas City that Fowler would be willing to abrogate the contract rather than see the hogs go through Kansas City, east. Negotiations were had with him, but it appears they have come to nought, as the meeting to-day voted to make the rate 18 cents from Jan. 1 on live hogs from all Missouri River points to Chicago.

Chairman Walker, of the Interstate Commerce Railway Association, speaking of the annual report of the Interstate Commission yesterday, said: "I am sorry to see that the Commission again dodges the pooling question. It was expected that it would have something to say on that matter, with perhaps a recommendation to Congress to modify the law which prohibits pooling. . . . If there is any plan besides pooling that will put an end to rate wars and demoralization I have been unable to find it. If pooling were established under government regulation and control it would be in the interest not only of the railroads but of the general public. There may be other ways of preventing the ruinous competition that has brought so many roads to the verge of ruin, but I have not heard them. Perhaps it can be done by fines and imprisonment, but I do not believe the evil will ever be remedied in that way."

No information has yet been furnished of the position the Wabash intends to take in respect to the recent order of the Indiana Federal Court in granting the Chicago & Erie a writ of assistance to remove the Wabash trains from the Erie tracks between Hammond and Laketon Junction, claiming that there can be no relation of landlord and tenant between railroads under the state law. It is likely that an appeal will be taken, and pending a final decision of the whole matter the Wabash will construct a line of its own from Montpelier, Ind., thus giving it a direct entrance of its own to this city from Detroit; and it would not be surprising to see it remove from its present quarters to the new Grand Central station.

Traffic Notes.

The ticket broker in St. Paul whose holding of nearly 5,000 tickets to Chicago over the Chicago, St. Paul & Kansas City has caused so much of a commotion advertised this week an open rate from St. Paul to Chicago of $9.50. The regular rate is $11.50. This will tend to make affairs as uncertain as before the recent agreement.

The total number of cars of wheat inspected at Winnipeg and at Port Arthur this season (to Dec. 1) is 3,933, over 2,500,000 bushels. This, with the amount of grain milled in the west and that in the elevators, shows that considerably over 3,000,000 bushels have been delivered by the farmers of the Canadian Northwest.

At a traffic meeting in Kansas City last week it came out that certain grain dealers who receive rebates on grain shipped eastward, these rebates being dependent upon the presentation of expense bills from Western roads, had practiced quite extensive frauds by presenting altered expense bills. It appears that the employés of three of the roads were implicated, and it is said that a resignation which has taken place since the disclosure was forced on account of it.

The threatened trouble in the Central Traffic Association, arising out of concessions to theatrical troupes by the Pennsylvania, has been averted. The company promises to immediately suspend the operation of circulars which authorized free transportation to be given to parties in certain cases, but the circular will not be suspended so far as it relates to transportation of excess baggage. The Central Traffic Association has this week adopted resolutions to sell one-way party tickets for 10 or more persons at two cents a mile, but the baggage allowance must not be over 150 lbs. per passenger.

The Interstate Commerce Commission.

The Commission has rendered a decision in the case of John C. Haddock against the Delaware, Lackawanna & Western Railroad on the application of complainant for supœnas to compel production of certain papers and contracts by third parties as well as by officers of the road, and upon the motion of the road to dismiss the complaint for want of jurisdiction because, before the act to regulate commerce was passed contracts were entered into with complainant controlling charges for carrying his coal. The Commission holds that complainant is precluded from showing that the rate on his coal to Hoboken ought to be different from that fixed by the contract; but the contracts for carriage to points north and west on the same terms given to other shippers do not preclude him from showing that such rates are unjust and unreasonable, and he is entitled to a hearing on that question. The question of the validity of the contracts was not presented, and no opinion is expressed as to the effect of the act on their validity. The application for subpœnas *duces tecum* is denied. The motion to dismiss complaint in toto is also denied, as good ground of complaint is set forth in respect to northern and western shipments.

The Commission has announced its decision in the case of Hervey Bates and H. Bates, Jr., against the Pennsylvania and other roads. This case was originally decided Feb. 7, 1890, and a rehearing was afterward granted on the application of defendants and the Baltimore & Ohio, which had appeared in the cause prior to the decision and filed argument. The opinion, written by Commissioner Veazey, states:

Upon a rehearing of this case the additional evidence warrants a finding contrary to what appeared and was found in the original hearing. It is now found that the cost of transporting the direct products of corn, including terminal expenses, properly chargeable as freight charges between Indianapolis and seaboard points, is greater on the product than on raw corn. Upon the evidence produced at the former hearing it was decided that no reason was shown for a differential rate between corn and the product. The difference in rate complained of was 4½ cents per 100 lbs. between Indianapolis and New York. Since the first hearing the defendants have reduced the differential to 2½ cents per 100 lbs. The complainants claimed there should be no difference. The evidence produced at the rehearing satisfied the Commission that the former order should be vacated and that no further order should now be made. The decision says:

The new facts developed on the rehearing are that the cost of the service to the carriers is, to some extent, greater for the products than the cost of the service for corn, and also that the downward pressure of competition in the transportation of corn was greater than it was as to the products of corn. Both of these facts furnished some reason for a difference in rate between the two commodities, but the evidence does not with sufficient precision show just what that difference should be from a railroad standpoint. The railroads having cured the original difference to so great an extent, it has been a very embarrassing question, which the Commission has carefully considered, whether it ought to undertake to go further and lessen this difference more than has already been done by the defendants themselves. . . As the traffic in corn is so much larger than that in the product, the public have great interest that the rate thereon should not be raised above what is just and reasonable for it, and that it should not be put above such a rate solely on account of individual interest in having it at the same rate with the product. The question is one of a just and reasonable rate for corn and for its direct products. The law undertakes to forbid discriminations that are unjust, but not to equalize advantages springing from rates that in themselves are just. It would be a violation of this proposition if the Commission should deviate from a just and reasonable rate in the case of either corn or its products for the sake of equalizing advantages of geographical location as between western and eastern millers.

Upon the evidence now before us we are clear that the present difference in the rate should not be increased, and are inclined to the belief that it can be diminished and the respective rates be just and reasonable, but the evidence in this case does not justify us in ordering the common rate to be the present rate on corn; and we think the public interest forbids us to make an order that is susceptible of being construed as an invitation to raise the rate on corn. . . .

Traffic on the New York and Brooklyn Bridge.

The annual report of the Board of Trustees of the East River Bridge shows that 40,898,484 persons used the structure during the year ending Dec. 1, 1890, of which number 30,676,411 were passengers on the railroad. This was an increase in total traffic over the corresponding period of last year of 374,820, and an increase in railroad passengers alone of 3,721,638. Since the railroad began operation it has been used by 180,721,240 passengers. The total receipts from the bridge traffic for the year were $1,020,956, of which amount the railroad earnings were $931,973. One day each year an accurate count is kept of persons and vehicles crossing the bridge. The count was taken this year Nov. 25. On that day there were 133,040 passengers over the bridge, and the total receipts were $6,915.04. The smallest number of passengers in any one hour was 379, between 2 and 3 a. m., and the greatest 17,538, between 5 and 6 p. m. The smallest number of vehicles crossing was 23, between 1 and 2 a. m., and the largest 436, between 4 and 5 p. m.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Dec. 6, amounted to 77,386 tons, against 70,892 tons during the preceding week, an increase of 6,494 tons, and against 80,430 tons during the corresponding week of 1889, a decrease of 3,049 tons. The proportions carried by each road were:

	W'k to Dec. 6.		W'k to Nov. 29.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	8,446	10.9	8,880	12.5
Wabash.....	4,249	5.5	5,527	7.8
Lake Shore & Michigan South.	12,752	16.5	12,743	18.0
Pitts., Ft. Wayne & Chicago...	9,795	12.7	7,402	10.4
Chicago, St. Louis & Pitts.....	11,366	14.7	10,547	14.9
Baltimore & Ohio.....	6,584	8.5	3,985	5.6
Chicago & Grand Trunk.....	9,235	11.9	8,010	11.3
New York, Chic. & St. Louis...	8,554	11.0	7,558	10.7
Chicago & Erie.....	6,405	8.3	6,255	8.8
Total.....	77,386	100.0	70,892	100.0

Of the above shipments 6,824 tons were flour, 31,743 tons grain, 5,848 tons millstuffs, 1,482 tons cured meats, 4,199 tons lard, 7,629 tons dressed beef, 1,052 tons butter, 1,640 tons hides, 148 tons wool, and 8,508 tons lumber. The three Vanderbilt lines together carried 38.4 per cent. while the two Pennsylvania lines carried 27.4 per cent. During the week the lake lines carried 23,162 tons, against 44,715 tons during the preceding week. Of the shipments 5,279 tons were flour and 13,416 tons grain.